IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of

Chiaki HAMADA et al.

Application No.: 10/815,765 Examiner: R. MANCHO

Filed: April 2, 2004 Docket No.: 119332

For: VEHICLE BRAKING CONTROL DEVICE FOR BRAKING FORCE DISTRIBUTION

BRIEF ON APPEAL

Appeal from Group 3664
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I. REAL PARTIES IN INTEREST

The real parties in interest for this appeal and the present application are Toyota Jidosha Kabushiki Kaisha and Advics Co., Ltd., by way of an Assignment recorded in the U.S. Patent and Trademark Office at Reel 015067, Frame 0711.

II. STATEMENT OF RELATED CASES

There are no prior or pending appeals, interferences or judicial proceedings, known to any inventor, any attorney or agent who prepared or prosecuted this application, or any other person who was substantively involved in the preparation or prosecution of this application, that may be related to, or that will directly affect or be directly affected by or have a bearing upon, the Board's decision in the pending appeal.

III. JURISDICTIONAL STATEMENT

The Board has jurisdiction under 35 U.S.C. §134(a). The Examiner mailed a Final Rejection on July 10, 2008, setting a three-month shortened statutory period for response. The time for responding to the Final Rejection expired on October 10, 2008. Rule 134. A Notice of Appeal and a Petition for Extension of Time requesting a three-month extension of time under Rule 136(a) were filed on Monday, January 12, 2009 (January 10, 2009 being a Saturday). The time for filing an Appeal Brief expires the later of two months from the filing of the Notice of Appeal, or one month from the mailing date of the Notice of Panel Decision if a Pre-Appeal Brief Request for Review is sought. Bd.R. 41.37(c) and Official Gazette Notice, July 12, 2005.

Because a Pre-Appeal Brief Request for Review was filed and the Notice of Panel decision was mailed on March 31, 2009, the period for timely filing an Appeal Brief is April 30, 2009. This Appeal Brief is being timely filed on April 30, 2009.

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V. TABLE OF AUTHORITIES

VI. STATUS OF AMENDMENTS

No Amendment After Final Rejection has been filed. Appellants instead filed a Request for Reconsideration on November 10, 2008, which was considered as evidenced by the November 26, 2008 Advisory Action. Appellants also filed a Pre-Appeal Brief Request for Review on January 12, 2009, which was considered as evidenced by the March 31, 2009 Notice of Panel Decision from Pre-Appeal Brief Review.

VII. GROUNDS OF REJECTION TO BE REVIEWED

1) Claims 1-15 are rejected as anticipated under 35 U.S.C. §102(e) by Watanabe, U.S. Patent Application Publication No. 2002/0185913.

VIII. STATEMENT OF FACTS

A. Technical Description of Invention

1. Appellants' invention is directed to a vehicle braking control device that controls a braking force distribution among the front and rear wheels of a vehicle. (Appellants' specification, page 1, lines 7-9).

2. Appellants' disclosed device includes a braking system (Appellants' Fig. 1A, and claims 1 and 12); at least one sensor monitoring an operational condition of the vehicle (e.g., master cylinder pressure Pm, deceleration Gx, difference between an average wheel speed of the front left and right wheels and rear left and right wheels ΔVw, Appellants' page 21, lines 5-21, and claims 1 and 12); and a controller (Appellants' controller 90, Fig. 1B, and claims 1 and 12) that is configured to execute both an anti-skid control (ABS control) and a braking force distribution control (BFD control).

3. Appellants' BFD control normally increases the braking force on the front wheels relative to the rear wheels (claims 1 and 12) responsive to a driver pressing on a brake pedal in order to avoid having a rear wheel locked prior to a front wheel when the master cylinder pressure Pm exceeds a holding pressure Pc. (Appellants' Figs. 3A and 3B, and page 16, lines 15-17 and page 17, lines 9-21).

4. However, when execution of ABS control for either of the front wheels is started during the BFD control, the braking force on the front wheels is decreased during execution of the BFD control. (Appellants' page 22, line 7 - page 23, line 13, and claims 1 and 12).

5. Appellants discovered that, if the braking force on either front wheel becomes high and renders a front wheel locked during BFD control (thus requiring ABS control), the combined effects of ABS control and BFD control would induce an excessive pressurization of the rear wheel cylinders, causing a deterioration of vehicle stability and braking controllability. (Appellants' page 22, lines 7-21).

6. In order to avoid disturbance in the vehicle attitude that would be caused if BFD control were to be abruptly cancelled, BFD control is not stopped when ABS control is started during the BFD control, but rather the pressure to the front wheels during BFD control is decreased. (Appellants' page 22, lines 7-14; page 22, line 21 - page 23, line 13, and claims 1 and 12; see also Appellants' Summary of the Invention on page 5, line 2-page 7, line 11).

7. Appellants are thus able to render BFD control compatible with ABS control in order to avoid deteriorated controllability of the vehicle. (Appellants' page 3, lines 18-20).

B. Applied Reference

8. Watanabe does not disclose rendering BFD control compatible with ABS control.

9. Watanabe also does not disclose the problems associated with starting ABS control while a braking system is performing BFD control.

10. Watanabe is directed to a vehicle brake control system that prevents an increase in a yaw rate of the vehicle when braking the vehicle while turning. (Watanabe's paragraph [0008]).

11. In particular, Watanabe performs a BFD control when the vehicle operator is braking the vehicle while turning in order to prevent an increase in yaw rate. (Watanabe's paragraphs [0063], [0072], [0073], and Figs. 5 and 6).

12. Watanabe also discloses performing ABS control when necessary in a way well known in the technical field (Watanabe's paragraph [0068]), and preventing BFD control when ABS control is being performed on either of the front wheels. (Watanabe's paragraph [0075]).

13. Watanabe does not consider starting ABS control during BFD control.

14. Watanabe does not disclose decreasing the braking force on the front wheels during BFD control in the event, *arguendo*, that ABS control is started during BFD control.

C. Start of Anti-Skid Control During Braking Force Distribution Control And Decreasing Front Wheel Braking Force Features Of Independent Claims 1 And 12

15. Independent claim 1 recites, *inter alia*, a controller that is configured to execute an anti-skid control and that is configured to execute a braking force distribution control, wherein braking force on the front wheels during execution of the braking force distribution control is increased, where a braking force increment on the front wheels is determined based upon an increment of the braking action by the driver detected by the detector; however, when execution of the anti-skid control for either of the front wheels is started during the braking force distribution control, the braking force increment on the front wheels is decreased during the braking force distribution control.

16. Independent claim 12 recites, *inter alia*, a controller that is configured to execute an anti-skid control and that is configured to execute a braking force distribution control, wherein braking force on the front wheels is increased during execution of the braking force distribution control, but decreased during execution of the braking force distribution control when execution of the anti-skid control for either of the front wheels is started during the braking force distribution control.

17. The Examiner rejected claims 1 and 12 as anticipated by Watanabe, asserting, *inter alia*, that the reference discloses the features of claims 1

and 12 identified in facts 15 and 16. (July 10, 2008 Final Rejection ("Office Action"), pages 2, 3, 5 and 6).

18. More specifically, pages 2, 3, 5 and 6 of the Office Action simply copy claims 1 and 12, and refer to Watanabe's abstract, paragraphs [0008], [0009], [0019]-[0021], [0062], [0068] and [0075] and Figs. 1-5 without providing any additional analysis.

19. Appellants respectfully disagree with the Office Action assertions in facts 17 and 18.

1. Braking Force Distribution Control Feature of Independent Claims 1 and 12

20. The Office Action, pages 2, 3, 5 and 6, refers to Watanabe's abstract, paragraphs [0008], [0009] and [0019]-[0021] and Figs. 1-5 in asserting that Watanabe discloses the BFD control of claims 1 and 12.

21. Appellants respectfully disagree with the Office Action assertion in fact 20 because, *inter alia*, Watanabe does not consider starting ABS control during BFD control.

22. Appellants also respectfully disagree with the Office Action assertion in fact 20 because, *inter alia*, Watanabe does not disclose decreasing the braking force on the front wheels during BFD control in the event, *arguendo*, that ABS control is started during BFD control.

23. Watanabe's abstract and paragraphs [0008], [0009] and [0019]-[0021] discuss different ways of increasing the braking force applied to the front

wheels such that the braking force applied to the front wheels versus the braking force applied to the rear wheels increases, and the advantages thereof.

24. Watanabe's abstract and paragraphs [0008], [0009] and [0019]-[0021] do not consider having ABS control started during BFD control as recited in claims 1 and 12, and do not disclose decreasing the braking force on the front wheels during BFD control in the event, *arguendo*, that ABS control is started during BFD control as recited in claims 1 and 12.

25. Watanabe's Figs. 1A and 1B illustrate a block diagram of a hydraulic circuit and a control unit, Fig. 2 is a sectional view of the control valve, Fig. 3 is a flowchart of the brake control routine, Fig. 4 is a flowchart showing a control scheme executed at step S30 of Fig. 3 where it is determined whether execution of BFD control should be allowed, and Fig. 5 is a graph that is used to calculate a pressure increase amount.

26. Watanabe's Figs. 1-5 again do not consider having ABS control started during BFD control as recited in claims 1 and 12, and do not illustrate decreasing the braking force on the front wheels during BFD control in the event, *arguendo*, that ABS control is started during BFD control as recited in claims 1 and 12.

27. Watanabe does not otherwise consider having ABS control started during BFD control as recited in claims 1 and 12, and does not otherwise disclose

decreasing the braking force on the front wheels during BFD control in the event, *arguendo*, that ABS control is started during BFD control as recited in claims 1 and 12.

28. In summary, Watanabe does not disclose the combination of features recited in claims 1 and 12 as set forth in facts 15 and 16.

2. Anti-Skid Control Feature Of Independent Claims 1 And 12

29. The Office Action, pages 3 and 6, refers to Watanabe's paragraphs [0062], [0068] and [0075] and Figs. 4 and 5 in asserting that Watanabe discloses starting ABS control during BFD control, and decreasing braking force during BFD control, as recited in claims 1 and 12.

30. Appellants respectfully disagree with the Office Action assertion in fact 29.

31. Watanabe's paragraph [0062] discusses performing ABS control by calculating the target brake pressure Pti of each wheel in accordance with a braking amount by a vehicle operator, while calculating the target brake pressure Pti so as to decrease excessive brake slip of the wheels.

32. Watanabe's paragraph [0068] states that "when anti-skid control is necessary, the target brake pressure Pti required for reducing excessive brake slip of the wheel is calculated in a way well known in the technical field."

33. Watanabe's paragraphs [0062] and [0068] do not discuss BFD control, or consider having ABS control started during BFD control as recited in claims 1 and 12, or disclose decreasing the braking force on the front wheels during BFD control in the event, *arguendo*, that ABS control is started during BFD control as recited in claims 1 and 12.

34. Watanabe's paragraph [0075] and Fig. 4 discuss and illustrate determining if ABS control is being performed in order to determine if BFD control should be allowed. (Step S30).

35. BFD control is not allowed if ABS control is being performed on either of the front wheels. (Watanabe's Steps S33:Yes, S34:Yes and S38 of Fig. 4, paragraph [0075]).

36. The Examiner asserts that BFD control is allowed in Watanabe if ABS control is being performed on both of the front wheels (Watanabe's Steps S33:No, S34:No and S37 of Fig. 4), while Appellants do not concede that Fig. 4 was so intended or that one of ordinary skill in the art would so understand it (Appellants' March 28, 2008 Amendment, page 7).

37. In any event, Watanabe's paragraphs [0075] and Fig. 4 do not consider having ABS control started during BFD control as recited in claims 1 and 12 because Watanabe is determining whether or not BFD control should be allowed.

38. If BFD control is allowed, Watanabe discloses increasing the braking force applied to the front wheels by a pressure increase amount A'. (Watanabe's paragraphs [0072] and [0073] and Steps S30:Yes and S80-S110 of Fig. 3).

39. Even assuming, *arguendo,* that BFD control is allowed in Watanabe when ABS control is being performed on both front wheels as the Examiner asserts (Watanabe's steps S33:No, S34:No and S37 of Fig. 4), Watanabe does not explain how to perform ABS control and BFD control simultaneously.

40. Watanabe does not disclose rendering BFD control compatible with ABS control.

41. Most significantly, Watanabe does not disclose decreasing the braking force on the front wheels during BFD control in the event, *arguendo*, that ABS control is started during BFD control as recited in claims 1 and 12.

42. Watanabe does not otherwise discuss ABS control.

43. The Office Action, page 7, lines 10-12, states that Appellants' arguments appear contradictory because Appellants admit that Watanabe's paragraph [0075] discloses determining if ABS control is being performed.

44. Appellants respectfully disagree with the Office Action assertion in fact 43.

45. Watanabe's paragraph [0075] and Fig. 4 discuss and illustrate determining if ABS control is being performed in order to determine if BFD control should be allowed.

46. Watanabe's paragraph [0075] and Fig. 4 do not consider whether BFD control is already occurring.

47. Therefore, Watanabe fails to consider having ABS control started during BFD control as recited in claims 1 and 12.

48. As discussed in facts 38-41, Watanabe also does not disclose decreasing the braking force on the front wheels during BFD control in the event, *arguendo*, that ABS control is started during BFD control as recited in claims 1 and 12.

49. The Office Action, page 8, line 5, states that "anti-skid control is also braking force distribution control."

50. Appellants respectfully disagree with the Office Action assertion in fact 49.

51. Appellants' BFD control normally holds the rear wheel braking pressure and increases the front wheel braking pressure in order to compensate for a shortage in braking force. (Appellants' page 16, lines 14-21).

52. Appellants' ABS control decreases the front wheel braking pressure in order to prevent the front wheels from being locked. (Appellants' page 22, lines 7-14).

53. Appellants' specification thus does not state that BFD control is also ABS control.

54. Watanabe also does not state that BFD control is also ABS control.

55. Watanabe instead distinguishes between BFD control and ABS control when Watanabe determines if ABS control is being performed before allowing BFD control. (Watanabe's Fig. 4).

56. In summary, Watanabe fails to disclose the combination of features recited in claims 1 and 12 as set forth in facts 15 and 16.

D. Faster Rate Of Decreasing Front Wheel Braking Force Feature Of Dependent Claim 13

57. Claim 13 depends from claim 12 and further recites that a rate of decreasing the front wheel braking force when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition for terminating the braking force distribution control is faster than a rate of decreasing the front wheel braking force when anti-skid control for either of the wheels is executed.

58. The Examiner rejected claim 13 as anticipated over Watanabe, asserting, *inter alia*, that the reference discloses the features of claim 13 identified in fact 46. (Office Action, page 6).

59. More particularly, the Office Action, page 6, simply copies claim 13 and again refers to Watanabe's abstract, paragraphs [0008], [0009], [0019]-[0021], [0062], [0068] and [0075] and Figs. 1-5.

60. Appellants respectfully disagree with the Office Action assertions in facts 58 and 59.

61. Watanabe's paragraph [0062] states that anti-skid control is performed by calculating the target brake pressure Pti of each wheel in accordance with a braking amount by a vehicle operator, while calculating the target brake pressure Pti so as to decrease excessive brake slip of the wheels.

62. Watanabe's paragraph [0068] simply states that ABS control is calculated in a way "well known" in the technical field.

63. Watanabe's paragraph [0075] and Figs. 3 and 4 disclose and illustrate determining if ABS control is being performed to determine if BFD control should be allowed.

64. Figs. 1, 2 and 5 fail to illustrate ABS control.

65. Watanabe's abstract and paragraphs [0008], [0009] and [0019]-[0021] discuss different ways of <u>increasing</u> the braking force applied to the front wheels such that the braking force applied to the front wheels versus the braking force applied to the rear wheels <u>increases</u>, and the advantages thereof.

66. In particular, Watanabe's paragraph [0008] states that BFD control is calculated as a product of the detected lateral acceleration and the detected speed of the vehicle.

67. Watanabe's paragraphs [0072]-[0073] disclose how the braking force applied to the front wheels is increased by a pressure increase amount A'.

68. Watanabe does not disclose, expressly or inherently, that any rate of decreasing the front wheel braking force is faster than another.

69. Watanabe therefore fails to disclose the feature of claim 13 as set forth in fact 57.

E. Dependent Claims

70. Claims 2-11 and 13-15 depend, directly or indirectly, from independent claim 1 or independent claim 12.

71. Claim 2 depends from claim 1 and further recites that the braking force on the rear wheels is increased when the anti-skid control is executed.

72. Claim 3 depends from claim 1 and further recites that the braking force increment on the front wheel is decreased until the increase reaches to zero.

73. Claim 4 depends from claim 1 and further recites that the decreasing of the braking force increment on the front wheel is interrupted if the anti-skid control is terminated but the increment does not reach zero.

74. Claim 14 depends from claim 12 and further recites that the braking force on the front wheel is decreased until the braking force reaches a braking force requested by the braking action by the driver.

75. Claim 15 depends from claim 12 and further recites that the increase of the braking force on the rear wheels is restricted during execution of the braking force distribution control but allowed when anti-skid control for either of the wheels is executed or when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition for terminating the braking force distribution control.

76. The Examiner rejected claims 2-4, 14 and 15 as anticipated by Watanabe, asserting, *inter alia*, that the reference discloses the features of claims 2-4, 14 and 15 identified in facts 71-75. (Office Action, pages 3 and 6).

77. More particularly, the Office Action, pages 3 and 6, simply copies claims 2-4, 14 and 15 and again refers to Watanabe's abstract, paragraphs [0008], [0009], [0019]-[0021], [0062], [0068] and [0075] and Figs. 1-5.

78. Appellants respectfully disagree with the Office Action assertions in facts 76 and 77.

79. As discussed in facts 61-67, Watanabe fails to disclose the further system operation details of claims 2-4, 14 and 15 as set forth in facts 71-75.

IX. ARGUMENT

The Examiner asserts that Watanabe discloses all of the features of independent claims 1 and 12, as well as dependent claims 2-11 and 13-15, thereby anticipating such claims. (Office Action, pages 2-8). In response, Appellants previously pointed out how the Examiner has erred. (November 10, 2008 Request for Reconsideration (hereinafter "Request"), pages 2-5; January 12, 2009 Pre-Appeal Brief Request for Review). Appellants again explain below why the Examiner's rejection of claims 1-15, as allegedly anticipated by Watanabe, is erroneous.

A. Watanabe Does Not Consider Starting An Anti-Skid Control During A Braking Force Distribution Control, And Accordingly Does Not Disclose Decreasing Braking Force on the Front Wheels During Braking Force Distribution Control, As Recited In Independent Claims 1 and 12

Watanabe fails to disclose a controller that is configured to execute both an anti-skid control and a braking force distribution control, wherein when execution of the anti-skid control for either of the front wheels is started during the braking force distribution control, the braking force increment on the front wheels is decreased during the braking force distribution control, as recited in claim 1. (Fact 15). Watanabe also fails to disclose a controller that is configured to execute both an anti-skid control and a braking force distribution control, wherein braking force is decreased during execution of the braking force distribution control when execution of the anti-skid control for either of the front

wheels is started during the braking force distribution control, as recited in claim 12. (Fact 16).

Watanabe fails to consider starting ABS control during BFD control. (Facts 13, 24, 26, 27, 33, 37 and 47). Therefore, Watanabe also fails to disclose decreasing the braking force on the front wheels during BFD control in the event, *arguendo*, that ABS control is started during BFD control. (Facts 14, 24, 26, 27, 33, 41 and 48).

Watanabe only mentions ABS control in passing because Watanabe is primarily concerned with controlling BFD control in order to prevent an increase in a yaw rate of the vehicle when braking the vehicle while turning. (Watanabe's paragraph [0008], Fact 10). As a result, Watanabe only discusses ABS control briefly in paragraphs [0062], [0068] and [0075] and Figs. 3 and 4. (Facts 29, 31, 32 and 34). None of these portions of Watanabe disclose the above combination of features of claims 1 and 12. (Facts 33, 37, 41 and 48).

In particular, Watanabe's paragraph [0062] discusses performing ABS control so as to decrease excessive brake slip of the wheels. (Fact 31). Watanabe's paragraph [0068] discuss performing ABS control when necessary in a way "well known" in the technical field. (Fact 32). Watanabe's paragraphs [0062] and [0068] do not discuss BFD control, or consider starting ABS control during BFD control, or disclose decreasing the braking force on the front

wheels during BFD control in the event, *arguendo*, that ABS control is started during BFD control. (Fact 33).

Watanabe determines whether execution of front and rear wheel BFD control should be allowed. (Watanabe's Step S30; Fact 34). Watanabe does not allow BFD control if ABS control is being performed on either of the front wheels. (Watanabe's Steps S33:Yes, S34:Yes and S38 of Fig. 4, paragraph [0075] and Fact 35).

Although not discussed in Watanabe's paragraph [0075], the Examiner asserts (but Appellants do not concede) that if ABS control is being performed on both of the front wheels, the flowchart of Watanabe's Fig. 4 arguably suggests that BFD control should be allowed. (Steps S33:No, S34:No and S37 and Fact 36). However, Watanabe clearly fails to consider having ABS control started during BFD control as recited in claims 1 and 12 because Watanabe is determining in Fig. 4 and paragraph [0075] whether BFD control should be allowed. (Fact 37).

Assuming, *arguendo*, that ABS control is being performed on both front wheels and that BFD control is allowed (Watanabe's Fig. 3, Step 30:Yes and Fact 36), Watanabe's Fig. 3 flowchart discloses increasing the braking force applied to the front wheels by a pressure increase amount A'. (Watanabe's Fig. 3, Step 30:Yes and Steps S80-S110 and paragraphs [0072] and [0073] and Fact 38). Watanabe does not explain how to perform ABS control and BFD control

simultaneously. (Fact 39). Watanabe also does not disclose rendering BFD control compatible with ABS control. (Fact 40). Most significantly, Watanabe does not disclose decreasing the braking force on the front wheels during BFD control in the event, *arguendo*, that ABS control is started during BFD control as recited in claims 1 and 12. (Fact 41).

The Office Action, pages 2, 3, 5 and 6, refers to Watanabe's abstract, paragraphs [0008], [0009] and [0019]-[0021] and Figs. 1-5 in asserting that Watanabe discloses the BFD control of claims 1 and 12. (Fact 20). However, Watanabe's abstract, and paragraphs [0008], [0009] and [0019]-[0021] fail to consider ABS control, and Figs. 1, 2 and 5 fail to consider ABS control. (Facts 23-25). In addition, as discussed above, Figs. 3 and 4 fail to consider starting ABS control during BFD control, and fail to disclose decreasing the braking force on the front wheels during BFD control in the event, *arguendo*, that ABS control is started during BFD control, as recited in claims 1 and 12. (Facts 26, 27, 33, 37 and 41).

Because Watanabe fails to disclose the above claimed combination of features, or identify any problems that such features were designed to overcome (Facts 8 and 9), Watanabe fails to achieve the advantages discovered by Appellants as indicated in Appellants' specification (Facts 6 and 7). In particular, as discussed on page 22, line 7-page 23, line 13 of Appellants' specification, ABS control for either of the front wheels is started and executed during BFD control

such that the braking force on the front wheels decreases during BFD control when ABS control is started during BFD control as recited in claims 1 and 12. (Facts 6, 15 and 16). Appellants' claimed invention thus avoids an abrupt cancellation of the BFD control, which causes a disturbance of the vehicle attitude. (Facts 5 and 6).

Contrary to the Office Action, at page 7, lines 10-12, Appellants' arguments are not contradictory with regard to Watanabe's paragraph [0075]. (Facts 45-48). Watanabe's paragraph [0075] and Fig. 4 discuss and illustrate determining if ABS control is being performed in order to determine if BFD control should be allowed. (Fact 45). Watanabe's paragraph [0075] and Fig. 4 do not consider whether BFD control is already occurring. (Fact 46). Therefore, Watanabe does not consider having ABS control started during BFD control as recited in claims 1 and 12. (Fact 47). Watanabe also does not disclose decreasing the braking force on the front wheels during BFD control in the event, *arguendo*, that ABS control is started during BFD control as recited in claims 1 and 12. (Fact 48).

The Office Action states (page 8, line 5) that "anti-skid control is also braking force distribution control." (Fact 49). Appellants respectfully disagree with this statement, which statement is contrary to Appellants' invention and to Watanabe.

Appellants' BFD control normally holds the rear wheel braking pressure and increases the front wheel braking pressure in order to compensate for a shortage in braking force. (Appellants' page 16, lines 14-21 and Fact 51). Appellants' ABS control decreases the front wheel braking pressure in order to prevent the front wheels from being locked. (Appellants' page 22, lines 7-14 and Fact 52). Appellants' specification does not state that BFD control is also ABS control. (Fact 53).

Watanabe likewise does not state that BFD control is also ABS control. (Fact 54). Watanabe instead distinguishes between BFD control and ABS control when Watanabe determines if ABS control is being performed before allowing BFD control. (Watanabe's Fig. 4 and Fact 55). Thus, it is clear from both Appellants' specification and from Watanabe that ABS control and BFD control are not one and the same.

Watanabe thus fails to disclose every feature of claims 1 and 12, either expressly or inherently, as required for anticipation. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987), and MPEP §2131; *see also In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993), and MPEP §2112(IV) (inherency requires that a feature is necessarily present, not just that it may be present). Therefore, claims 1 and 12 are not anticipated by Watanabe.

Because Watanabe fails to consider starting ABS control during BFD control, and because Watanabe fails to disclose decreasing the braking force on the front wheels during BFD control in the event, *arguendo*, that ABS control is started during BFD control, Watanabe fails to anticipate independent claims 1 and 12.

B. Watanabe Fails to Disclose Using A Faster Rate Of Decreasing Front Wheel Braking Force As Recited In Dependent Claim 13

Dependent claim 13 recites that a rate of decreasing the front wheel braking force when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition for terminating the braking force distribution control is faster than a rate of decreasing the front wheel braking force when anti-skid control for either of the wheels is executed. (Fact 57). Appellants did not previously raise this argument.

The Office Action (page 6) rejects claim 13 as anticipated by Watanabe, asserting, *inter alia*, that Watanabe discloses the feature of claim 13. (Facts 58 and 59). Appellants respectfully disagree.

Watanabe's paragraph [0062] states that ABS control is performed by calculating the target brake pressure Pti of each wheel in accordance with a braking amount by a vehicle operator, while calculating the target brake pressure Pti so as to decrease excessive brake slip of the wheels. (Fact 61). Watanabe's paragraph [0068] states that ABS control is calculated in a way

"well known" in the technical field. (Fact 62). Watanabe's paragraph [0075] and Figs. 3 and 4 disclose and illustrate determining if ABS control is being performed to determine if BFD control should be allowed (Fact 63) and Figs. 1, 2 and 5 fail to illustrate ABS control (Fact 64). Watanabe's abstract and paragraphs [0008], [0009] and [0019]-[0021] discuss different ways of increasing the braking force applied to the front wheels such that the braking force applied to the front wheels versus the braking force applied to the rear wheels increases, and the advantages thereof. (Fact 65). In particular, Watanabe's paragraph [0008] states that BFD control is calculated as a product of the detected lateral acceleration and the detected speed of the vehicle. (Fact 66). Watanabe's paragraphs [0072]-[0073] disclose how the braking force applied to the front wheels is increased by a pressure increase amount A'. (Fact 67).

These portions and the remainder of Watanabe do not disclose, expressly or inherently, that any rate of decreasing the front wheel braking force is faster than another. (Fact 68). Watanabe thus fails to disclose the feature of claim 13. (Fact 69). Therefore, claim 13 is not anticipated by Watanabe.

C. Dependent Claims

Claims 2-11 and 13-15 depend either directly or indirectly from one of independent claims 1 and 12. (Fact 70). Claims 2-11 and 13-15 are thus patentable at least for their dependency from claim 1 or claim 12, as well as for the additional features they recite. More particularly, given that Watanabe fails

to disclose the combination of features recited in independent claims 1 and 12 discussed above relating to rendering BFD control compatible with ABS control, Watanabe certainly does not disclose the further system operation details of the dependent claims.

For example, Watanabe fails to disclose that the braking force on the rear wheels is increased when the anti-skid control is executed as recited in claim 2 (Fact 71), that the braking force increment on the front wheel is decreased until the increase reaches to zero as recited in claim 3 (Fact 72), that the decreasing of the braking force increment on the front wheel is interrupted if the anti-skid control is terminated but the increment does not reach zero as recited in claim 4 (Fact 73), that the braking force on the front wheel is decreased until the braking force reaches a braking force requested by the braking action by the driver as recited in claim 14 (Fact 74), or that the increase of the braking force on the rear wheels is restricted during execution of the braking force distribution control but allowed when anti-skid control for either of the wheels is executed or when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition for terminating the braking force distribution control as recited in claim 15 (Fact 75).

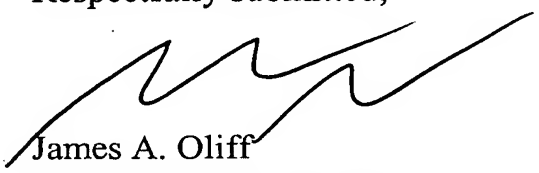
The Office Action (pages 3 and 6) rejects claims 2-4, 14 and 15 as anticipated by Watanabe, asserting, *inter alia*, that Watanabe discloses the features of claims 2-4, 14 and 15. (Fact 76). The Office Action (pages 3 and 6)

again simply copies the claims and again refers to Watanabe's abstract, paragraphs [0008], [0009], [0019]-[0021], [0062], [0068] and [0075] and Figs. 1-5. (Fact 77). For the reasons discussed above, Appellants respectfully disagree that Watanabe discloses the further system operation details of the dependent claims. (Facts 78 and 79).

X. CONCLUSION

For all of the reasons discussed above, it is respectfully submitted that the rejection is in error and that claims 1-15 are in condition for allowance. Appellants respectfully request this Honorable Board to reverse the rejection of claims 1-15.

Respectfully submitted,



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XI. APPENDIX A - CLAIMS SECTION

1. (Rejected) A device for controlling a braking of a vehicle having front and rear wheels, comprising:

a braking system generating braking forces on the respective wheels,

at least one sensor monitoring an operational condition of the vehicle including a detector detecting an amount of a braking action by a driver of the vehicle, and

a controller that is configured to execute an anti-skid control and that is configured to execute a braking force distribution control in which braking force on the front wheels is increased in comparison with braking force on the rear wheels when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition, wherein:

braking force on the front wheels during execution of the braking force distribution control is increased, where a braking force increment on the front wheel is determined based upon an increment of the braking action by the driver detected by the detector; however, when execution of the anti-skid control for either of the front wheels is started during the braking force distribution control, the braking force increment on the front wheels is decreased during the braking force distribution control.

2. (Rejected) A device of claim 1, characterized in that braking force on the rear wheels is increased when the anti-skid control is executed.

3. (Rejected) A device of claim 1, characterized in that the braking force increment on the front wheel is decreased until the increase reaches to zero.

4. (Rejected) A device of claim 1, characterized in that the decreasing of the braking force increment on the front wheel is interrupted if the anti-skid control is terminated but the increment does not reach zero.

5. (Rejected) A device of claim 1, wherein the braking system comprises a hydraulic circuit connected with a master cylinder and braking force generating apparatus including wheel cylinders provided for the respective wheels, and the braking action is reflected in a pressure in the master cylinder, characterized in that the decreasing of the braking force increment is executed by decreasing braking pressures in the front wheel cylinders.

6. (Rejected) A device of claim 2, wherein the hydraulic circuit comprises a hydraulic circuit connected with a master cylinder and braking force generating apparatus including wheel cylinders provided for the respective wheels; the braking action is reflected in a pressure in the master cylinder; and valves selectively allowing fluid communication between the master cylinder and the rear wheel cylinders, characterized in that the increasing of the rear wheel braking force is executed by opening the valves.

7. (Rejected) A device of claim 5, wherein the hydraulic circuit comprises at least a common line supplying at least one of the front wheel cylinders and at least one of the rear wheel cylinders, and at least a pressure regulating valve in the common line regulating a pressure in the common line and selectively fluidly connecting the common line to master cylinder.

8. (Rejected) A device of claim 7, wherein the hydraulic circuit is a cross dual circuit type.

9. (Rejected) A device of claim 7, wherein the hydraulic circuit is of front-rear dual circuit type.

10. (Rejected) A device of claim 7, wherein the hydraulic circuit comprises valves selectively allowing fluid communication between the common line and the rear wheel cylinders, characterized in that the increasing of the rear wheel braking force is executed by opening the valves.

11. (Rejected) A device of claim 6, wherein the opening of the valves is executed intermittently.

12. (Rejected) A device for controlling a braking of a vehicle having front and rear wheels, comprising:

a braking system generating braking forces on the respective wheels,

at least one sensor monitoring an operational condition of the vehicle including a detector detecting an amount of a braking action by a driver of the vehicle, and

a controller that is configured to execute an anti-skid control and that is configured to execute a braking force distribution control in which braking force on the front wheels is increased in comparison with braking force on the rear wheels when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition for starting the braking force distribution control, wherein:

braking force on the front wheels is increased during execution of the braking force distribution control, but decreased during execution of the braking force distribution control when execution of the anti-skid control for either of the front wheels is started during the braking force distribution control.

13. (Rejected) A device of claim 12, wherein a rate of decreasing the front wheel braking force when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition for terminating the braking force distribution control is faster than a rate of decreasing the front wheel braking force when anti-skid control for either of the wheels is executed.

14. (Rejected) A device of claim 12, wherein the braking force on the front wheel is decreased until the braking force reaches a braking force requested by the braking action by the driver.

15. (Rejected) A device of claim 12, wherein the increase of the braking force on the rear wheels is restricted during execution of the braking force distribution control but allowed when anti-skid control for either of the wheels is executed or when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition for terminating the braking force distribution control.

XII. APPENDIX B - CLAIM SUPPORT AND DRAWING ANALYSIS SECTION

1. (Rejected) A device for controlling a braking of a vehicle having front and rear wheels, comprising:

a braking system **{Fig. 1A; page 11, lines 10-19}** generating braking forces on the respective wheels **{front left and right wheels FL, FR, and rear left and right wheels RL, RR}**,

at least one sensor monitoring an operational condition of the vehicle **{master cylinder pressure Pm, deceleration Gx, difference between an average wheel speed of the front left and right wheels FL, FR and rear left and right wheels RL,RR, ΔVw, page 21, lines 5-21}** including a detector detecting an amount of a braking action by a driver of the vehicle **{e.g., by depressing a brake pedal 12}**, and

a controller **{controller 90; Fig. 1B}** that is configured to execute an anti-skid control **{ABS control}** and that is configured to execute a braking force distribution control **{BFD control}** in which braking force on the front wheels **{front left and right wheels FL, FR}** is increased in comparison with braking force on the rear wheels **{rear left and right wheels RL, RR; Figs. 3A-3B}** when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition **{Pm>Pc, Gx>Gxs,**

ΔVw>predetermined value; page 16, lines 14-21, page 24, lines 14-23}, wherein:

braking force on the front wheels **{front left and right wheels FL, FR}** during execution of the braking force distribution control **{BFD control}** is increased, where a braking force increment **{increment ΔPf}** on the front wheel **{front left and right wheels FL, FR}** is determined based upon an increment of the braking action by the driver detected by the detector **{page 25, lines 10-18}**; however, when execution of the anti-skid control **{ABS Control}** for either of the front wheels **{front left and right wheels FL, FR}** is started during the braking force distribution control **{BFD control; page 22, lines 7-14}**, the braking force increment **{increment ΔPf}** on the front wheels **{front left and right wheels FL, FR}** is decreased during the braking force distribution control **{BFD control; page 22, line 22 - page 23, line 13 and page 26, lines 2-15}**.

2. (Rejected) A device of claim 1, characterized in that braking force on the rear wheels **{rear left and right wheels RL, RR}** is increased when the anti-skid control **{ABS Control}** is executed **{page 22, lines 11-14}**.

3. (Rejected) A device of claim 1, characterized in that the braking force increment **{increment ΔPf}** on the front wheel **{front left and right wheels FL, FR}** is decreased until the increase reaches to zero **{page 23, lines 11-13}**.

4. (Rejected) A device of claim 1, characterized in that the decreasing of the braking force increment **{increment ΔPf}** on the front wheel **{front left and right wheels FL, FR}** is interrupted if the anti-skid control **{ABS Control}** is terminated but the increment does not reach zero **{page 23, lines 7-13 and page 26, lines 16-19}**.

12. (Rejected) A device for controlling a braking of a vehicle having front and rear wheels, comprising:

a braking system **{Fig. 1A; page 11, lines 10-19}** generating braking forces on the respective wheels **{front left and right wheels FL, FR, and rear left and right wheels RL, RR}**,

at least one sensor monitoring an operational condition of the vehicle **{master cylinder pressure Pm, deceleration Gx, difference between an average wheel speed of the front left and right wheels and rear left and right wheels ΔVw, page 21, lines 5-21}** including a detector detecting an amount of a braking action by a driver of the vehicle **{e.g., by depressing a brake pedal 12}**, and

a controller **{controller 90; Fig. 1B}** that is configured to execute an anti-skid control **{ABS control}** and that is configured to execute a braking force distribution control **{BFD control}** in which braking force on the front wheels **{front left and right wheels FL, FR}** is increased **{increment ΔPf}** in comparison with braking force on the rear wheels **{rear left and right wheels**

RL, RR} when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition for starting the braking force distribution control **{Pm>Pc, Gx>Gxs, ΔVw>predetermined value; page 16, lines 14-21, page 24, lines 14-23}**, wherein:

braking force on the front wheels **{front left and right wheels FL, FR}** is increased during execution of the braking force distribution control **{BFD control}**, but decreased during execution of the braking force distribution control **{BFD control}** when execution of the anti-skid control **{ABS control}** for either of the front wheels **{front left and right wheels FL, FR}** is started during the braking force distribution control **{BFD control; page 22, line 22 - page 23, line 13 and page 26, lines 2-15}**.

13. A device of claim 12, wherein a rate of decreasing the front wheel braking force **{increment ΔP}** when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition for terminating the braking force distribution control **{Pm<Pc, Gx<Gxs, Δvu<predetermined value}** is faster than a rate of decreasing the front wheel braking force **{increment ΔPf}** when anti-skid control for either of the wheels is executed **{page 7, lines 12-24 and page 26, line 20 - page 27, line 12}**.

14. (Rejected) A device of claim 12, wherein the braking force on the front wheel **{front left and right wheels FL, FR}** is decreased until the braking

force reaches a braking force requested by the braking action by the driver {**page 26, lines 2-12**}.

15. (Rejected) A device of claim 12, wherein the increase of the braking force on the rear wheels {**rear left and right wheels RL, RR**} is restricted during execution of the braking force distribution control {**page 16, lines 14-21**} but allowed when anti-skid control {**ABS control**} for either of the wheels {**front left and right wheels FL, FR**} is executed {**page 22, lines 11-14**} or when an operational condition {**master cylinder pressure Pm, deceleration Gx, difference between an average wheel speed of the front left and right wheels FL, FR and rear left and right wheels RL,RR, ΔVw, page 21, lines 5-21**} monitored by a sensor among the at least one sensor satisfies a predetermined condition for terminating the braking force distribution control {**Pm<Pc, Gx<Gxs, ΔVw<Vwe; page 21, line 22-page 22, line 3**}.

XIII. APPENDIX C - MEANS OR STEP PLUS FUNCTION ANALYSIS SECTION

NONE

XIV. APPENDIX D - EVIDENCE SECTION

A copy of each of the following items of evidence relied on by the Appellants and/or the Examiner in this appeal is attached:

Table of Contents

VEHICLE BRAKING CONTROL DEVICE FOR BRAKING FORCE DISTRIBUTION

Background of the Invention

Field of the Invention

The present invention relates to a device for controlling brakes of a vehicle such as an automobile, and more specifically, to such a device that controls braking force distribution among front and rear wheels in a vehicle.

Description of Prior Art

During braking of a vehicle, a rear wheel is liable to be locked because its frictional circle is shrunk due to the forward shifting of the load of the vehicle. The locking of a rear wheel, prior to a front wheel, induces serious deterioration of a vehicle running behavior, such as disturbance in the attitude and/or spinning of a vehicle body. In order to avoid the locking of a rear wheel, braking force distribution (BFD) control has been proposed to keep braking force on rear wheels lower than on the front wheels. In such BFD control, braking pressures applied to rear wheel cylinders in a hydraulic braking system is held, reduced or pulsatively increased, i.e. the increase in braking force generated on rear wheels is restricted, providing a distribution of braking force biased to front wheels. Usually, BFD control, often referred to as "Electronic Braking force Distribution Control (EBD

control)", is executed by a computerized device operating a plurality of solenoid valves in a hydraulic circuit. Examples of devices executing EBD control are seen in Japanese Laid-Open Patent Publications (JP) Nos. 5-213169 and 2001-219834.

Under EBD control, a demand from a driver of a vehicle for increasing braking force (e.g. a depression of a brake pedal) is modified for the restriction of braking force on rear wheels, which would cause the reduction of the total braking force. Thus, the driver would feel that the actually generated braking force is incompatible with his braking operation. In order to eliminate this feeling of the incompatibleness while maintaining the braking performance and behavior of a vehicle, JP No. 2001-219834 discloses an EBD control device, in which, after once restricted, braking force on rear wheels is pulsatively increased in response to the increase of a braking action by a driver under a certain running condition. For preventing the locking of rear wheels, however, braking force on the rear wheels could not be increased limitlessly.

Accordingly, it is preferable that, in BFD control device, total braking force on a vehicle body may be rendered as close to the amount requested by a driver of the vehicle as possible, without inducing the locking of the rear wheels and the instability in the vehicle attitude induced therefrom.

By the way, even during execution of BFD control, Anti-skid (ABS) control is to be executed if either of wheels is being locked (Because of BFD biased to front wheels, usually, a front wheel is more liable to be locked than a rear wheel.). During ABS control, decreasing and increasing braking

pressure for a wheel to be controlled is repeated to adjust the slip ratio of the wheel, and thereby the slipping or locking of the wheel is prevented. Since a condition requiring ABS control is to be controlled urgently, ABS control will operate a hydraulic circuit of a brake system to change wheel cylinder pressures while ignoring the setting of the pressure by BFD control. Further, when the front wheel is under ABS control, the rear wheel braking pressure is often increased for compensating for the restriction of the front wheel braking force and obtaining total braking force on a vehicle. In such a case, namely, when BFD and ABS controls are executed subsequently and/or alternatively, the condition in the hydraulic circuit is liable to be out of control of a driver, causing deterioration of the braking controllability of the vehicle.

Accordingly, a BFD control device should be improved in order to render it compatible with ABS control without deteriorating the controllability of the vehicle as well as the advantages of both BFD and ABS controls.

Summary of Invention

According to the present invention, there is provided a novel braking control device for a vehicle executing BFD control compatible with ABS control. A vehicle equipped with the control device has front and rear wheels, a braking system including braking force generating apparatuses provided for the respective wheels; at least a sensor monitoring an operational condition of the vehicle including a detector detecting an amount

of braking action by a driver of the vehicle. In response to a variation of the operational condition monitored by the sensor, the control device executes BFD control in which braking force on the rear wheels is lowered in comparison with that on front wheels while the braking force on the front wheels is increased based upon an increment of the braking action amount by the driver detected by the detector. Namely, further increase in the braking action after the starting of BFD control is reflected in the front wheel braking force. Upon starting anti-skid control for either of the wheels during the execution of BFD control, however, an increment of the front wheel braking forces to be requested by BFD control is decreased.

As described above, the restriction of rear wheel braking forces would render the total braking force on a vehicle body short. Thus, preferably, the inventive BFD control device not only restricts the increase of braking force on the rear wheels by holding the rear wheel cylinders at a holding pressure determined based upon vehicle's running conditions (e.g. by closing valves in the lines to the rear wheel cylinders), but also increases braking force on the front wheels for compensating the shortage of the rear wheel braking force and ensuring the generation of total force to be applied on a vehicle body. The increment of the front wheel pressure may be determined as a function of the restricted amount of the braking force on the rear wheels so as to render the resultant force increment on the front wheel equal to the force decrement on the rear wheels. Thus, the total braking force on the vehicle body can be rendered in conformity with the amount requested by a driver of the vehicle without the locking of the rear wheels and instability in the

vehicle attitude induced therefrom.

Further, because of BFD control biased to front wheels, a front wheel is more liable to enter into the locked condition than a rear wheel. Thus, usually, ABS control starts for either of front wheels, first. Under such a condition, since no longer preferable is BFD biased to the front wheels, the increment of the front wheel braking force requested by BFD control will be reduced. Preferably, the process of reduction of the increment is executed gradually, avoiding abrupt variation of the front wheel braking force that would deteriorate the stability of the running condition of the vehicle; and excessive reduction of the deceleration of a vehicle which would render a driver anxious. Further, preferably, the reduction of the increment is executed irrespective of the braking action by the driver (the increment for the front wheel is determined based upon the driver's operation under a normal BFD control.).

The reduction of the increment for the front wheels is advantageous for avoiding conflict of BFD and ABS controls especially in a hydraulic braking system.

A hydraulic braking system, typically employed in a four-wheeled vehicle, has valves, provided for individual wheel cylinders, for adjusting the respective braking pressure; and at least a common hydraulic line for applying braking pressure from a pressure supply to the wheel cylinders. More specifically, such a braking system has dual circuits, the one for front wheels and the other for rear wheels (front and rear (F-R) dual circuits), or the one for front-left and rear-right wheels and the other for front-right and

rear-left wheels (cross (X) dual circuits), each circuit having a common line, the pressure in which is controlled with a single valve. In those circuit systems, if one wheel in one circuit is under ABS control and the other still under BFD control, these controls will conflict with each other: the pressure variation in the common line affects on both the wheels through the repetition of opening and closing of the valves involved with ABS control.

Such a confliction of BFD and ABS controls is serious especially in X dual circuit system where a rear wheel cylinder and a front wheel cylinder are connected with a single common line.

Generally, when ABS control is started for a front wheel, valves of the rear wheels are opened for increasing their braking pressures in order to compensate for the shortage of the front wheel braking force (as described in Background of Invention). Under BFD control, however, the common line is highly pressurized for increasing the front wheel braking pressure in response to the braking action. So, if a valves for a rear wheel is opened, the highly pressurized braking fluid in the common line would rush into the corresponding rear wheel cylinder, and thereby the rear wheel cylinder is excessively pressurized, rendering the rear wheel braking force excessive abruptly, which induces the deterioration of the vehicle stability.

Moreover, in both types of F-R and X dual circuits, if the front wheel braking pressure is continuously increased in response to the braking action while the rear wheel braking pressure is also increased in response to starting of ABS control, the total braking force on a vehicle would be excessive in comparison with the braking force intended by the driver, and

thus, the braking controllability of the vehicle is deteriorated.

In accordance with the present invention, the above-mentioned conflict of ABS and BFD controls and its undesirable results, occurring in hydraulic braking systems, are avoided by reducing the braking pressure for the front wheel, i.e. by smoothly fading out the effect of BFD control after starting of ABS control.

The reduction of the increment for the front wheel braking force requested through BFD control may be continued until the increment is reduced to 0 as long as ABS control continues. This reduction may be ceased together with the termination of ABS control: Then, BFD control will be normally executed because no longer conflict exists.

By the way, upon terminating BFD control, irrespective of its reason, the holding of the rear wheel braking force will be released, e.g. the valves for isolating rear wheel cylinders from the common line will be opened,. When BFD control is to be ceased due to abnormal reason, such as a failure of sensors or detectors, however, it is possible that the increment for the front wheel still has a significant value and the common line is still under highly pressurized, so that the opening of the valves would cause an abrupt variation of the braking force on the wheels. In order to avoid such an abrupt variation, it is preferable to reduce the increment for the front wheel. In this case, the rate of the reduction is preferably faster than the rate of reduction during execution of ABS control, because it is preferable to get rid of the effect of BFD control under such an abnormal condition as soon as possible.

In one embodiment of the present invention implemented in a hydraulic braking system, an increment in front wheel braking force, required through this control, may be estimated based upon a rear wheel braking pressure. In this regard, braking force generating apparatuses for the front and rear wheels, even supplied with operational fluid from a master cylinder at the same pressure, exhibit different braking performances, which decreases with the increase of a vehicle speed. Thus, in derivation of the increment to be added into the front wheel braking pressure for generating the required increment in the front wheel braking forces, an amount of a braking action by a driver of the vehicle and parameters indicating braking performances of braking force generating apparatuses of the front and rear wheels will be taken into account. Then, the precise and appropriate control of the front wheel braking force is allowed based upon pressures in a hydraulic circuit of a braking system. In this connection, for reflecting the vehicle-speed dependence of the performance of the braking force generating apparatus in the control, preferably, the braking performance indicated by the parameters should have the same vehicle-speed dependence of decreasing with the increase of a vehicle speed. For a parameter of such braking performances, useful is a vehicle speed-dependent, braking effectiveness factor of a front wheel upon a vehicle.

Further, preferably, the amount of rear wheel braking force to be decremented or the holding pressure may be determined based upon a vehicle speed, a deceleration and/or other vehicle running condition at the

starting of BFD control.

Thus, it is an object of the present invention to provide new and novel devices for controlling a brake of a vehicle for executing braking force distribution among front and rear wheels of the vehicle, in which the braking force distribution control is executed in a manner compatible with Anti-skid control.

It is another object of the present invention to provide such devices in which, by reducing the effect of braking force distribution control, no conflict of braking force distribution and Anti-skid control occurs.

It is a further object of the present invention to provide such devices for a hydraulic braking system having dual circuits, wherein the increment in a front wheel braking pressure requested through BFD control is reduced during execution of Anti-skid control for either of wheels, preventing braking force on a vehicle from being excessive.

It is a further object of the present invention to provide such devices for X dual circuit braking system, wherein, by reducing the front wheel braking pressure during execution of Anti-skid control, rushing of highly pressurized braking fluid into rear wheel cylinders is prevented.

It is another object of the present invention to provide such devices wherein a control mode is switched into another smoothly, thereby avoiding abrupt change of braking force on a vehicle, a shortage of total braking force on a vehicle, and deterioration of braking controllability of a driver due to Anti-skid control.

Other objects and advantages of the present invention will be in part

apparent and in part pointed out hereinafter.

Brief Description of the Drawings

In the accompanying drawings,

Fig. 1A is a schematic diagram of a hydraulic circuit in a braking control device for a four-wheeled vehicle of a preferred embodiment according to the present invention;

Fig. 1B is a schematic diagram of an electronic controller in a braking control device for operating the components in the hydraulic circuit shown in Fig. 1A;

Fig. 2 is a schematic, sectional view of a pressure regulating valve employed in the hydraulic circuit shown in Fig. 1A;

Fig. 3A shows a phase diagram of condition of braking force distribution among front and rear wheels, showing an ideal braking force distribution line (two-dotted line), an actual braking force distribution line (thin solid line) in a case that the same braking pressure is applied to the front and rear wheels; and a braking force distribution line obtained in a preferred embodiment of the present invention;

Fig. 3B shows graphs of the relations between braking pressures Pf, Pr in front and rear wheels and master cylinder pressure Pm under braking force distribution control of a preferred embodiment of the present invention;

Fig. 4A shows a map of basic holding pressure for rear wheels Pcs vs. a vehicle speed V, used in calculation of the basic holding pressure;

Fig. 4B shows a map of a correction pressure ΔPc vs. deceleration Gx,

used in calculation of the correction pressure;

Fig. 5 shows a map of braking effectiveness factor of a front wheel on a vehicle vs. a vehicle speed, used in correction of the braking pressure increment for a front wheel;

Fig. 6 is a example of a flowchart executed in a braking force distribution control device of a preferred embodiment of the present invention.

Description of Preferred Embodiments

Fig. 1 illustrates a schematic diagram of a braking system implementing an embodiment of a control device for controlling braking force for a vehicle, enabling BFD control according to the present invention, which braking system consists of a hydraulic circuit 10 (Fig. 1A), transmitting a pressure in a master cylinder 14 (master cylinder pressure) to wheel cylinders 26i (i = FL, FR, RL, RR = front-left, front-right, rear-left and rear-right wheels, respectively) in braking force generating apparatuses provided for the respective wheels (not shown), and an electronic controller 90 (Fig. 1B) controlling brake fluid flows in the hydraulic circuit by operating solenoid valves and other components therein.

Referring to Fig. 1A, the illustrated hydraulic circuit 10 are of X dual circuit type, having two circuits, the one 10A for a pair of front left and right wheel cylinders 26FL, 26RR and the other 10B for a pair of rear left and right wheel cylinders 26FR, 26RL. It should be noted that the two circuits may have the same piping structure, otherwise noted (In an actual braking

system, these may be different from each other, of course).

As usual, a braking action of a driver of the vehicle, e.g. by depressing a brake pedal 12, pressurizes brake fluid in the master cylinder 14, compartmentalized into master cylinder chambers 14A and 14B with a free piston 16 movably supported with springs. To each chamber 14A, B connected is a common line 18A, B of the corresponding circuit 10A, B, respectively, leading to two branches 20i connected to the respective wheel cylinders 26i. In each branch 20i, there is provided a two-state, normally opened, solenoid valve 28i, selectively allowing brake fluid from the common line 18A, B (i.e. from the master cylinder 14) to flow into the respective wheel cylinder 26i, and thereby the wheel cylinder 26i will be selectively pressurized or held at a pressure by opening or closing the corresponding valve 28i. In order to avoid excessive pressurization of each wheel cylinder, a check valve 30i, allowing only flow from the wheel cylinder 26i to the common line 18A, B, is provided in parallel to the solenoid valve 28i. The branches 20i are also connected with buffer reservoirs 38A, B, provided with the respective circuit 10A, B, via two-state, normally closed, solenoid valves 34i as shown, so that the pressure in each of the wheel cylinders can be selectively released by opening the corresponding valve 34i.

Each circuit 10A, B further comprises a normally opened, linear pressure regulation valve 22A, B in the corresponding common line 18A, B; a motor-driven pump 42A, B with a damper 48A, B, positioned between the reservoir 38A, B and the common line 18A, B; and a normally closed, solenoid valve 60A, B selectively fluidly communicating the master cylinder

chamber 14A, B to the corresponding pump input. These components are provided for regulating the pressure in the common line when braking pressure in a wheel cylinder 26i is to be increased beyond master cylinder pressure.

In detail, when the linear pressure regulation valve 22A, B and valve 60A, B are closed and opened, respectively, the master cylinder pressure is supplied to the pump input. Then, the pump 42A, B, when operated, pumps up brake fluid from the reservoir 38A, B and the master cylinder into the common line 18A, B. As described below in more detail, the linear pressure regulating valve 22A, B, when switched into a closed position, allows flow from the common line to the master cylinder only when the pressure in the common line exceeds a pressure determined by controlling the energization current supplied to solenoid coils in accordance with the controller 90. Further, since the master cylinder pressure is supplied through the valve 60A, B to the pump input, the pressure in the common line will not be lowered below the master cylinder pressure. A check valve 24A, B, connected in parallel with the regulating valve 22 A, B, also prevents the common line pressure from lowering below the master cylinder pressure. Accordingly, the pressure in the common line 18A, B is regulated at a pressure beyond the master cylinder pressure under the control of the controller 90.

Check valves 44A, B, 46A, B and 52A, B may be provided for avoiding any flow in undesirable directions. The damper 48A, B may be provided for smoothing out the pump output.

Referring to Fig. 1B, Electronic controller 90 incorporates a microcomputer 92, which may be of an ordinary type including a central processor unit, a read only memory, a random access memory, input and output port means and a common bus interconnecting these elements (not shown). The microcomputer 92 receives a signal of master cylinder pressure *Pm*, from a master cylinder pressure sensor 96 provided near the master cylinder 14; a signal of a vehicle speed *V* from a vehicle speed sensor 98; a signal of a vehicle longitudinal deceleration Gx from a longitudinal deceleration sensor 100; signals of wheel speeds Vwi from the respective wheel speed sensors 102i; calculates target braking pressures Pti (i= FL, FR, RL, RR) and operates the valves, pumps, etc. through a driving device 94 in accordance with a control flow and related data, memorized in the microcomputer, as explained about later. The sign of the deceleration signal Gx is defined as positive in the direction decreasing the vehicle speed.

Fig. 2 shows a schematic diagram of the linear pressure regulating valve 22A(B), incorporating the check valve 24A(B), provided in each common line 18F, R. As shown, the valve comprises a housing 72 receiving an inlet line 18I connected to the master cylinder chamber 14A(B) and an outlet line 18O leading to the common line 18A(B) for the wheel cylinders 26i; a valve chamber 70; a valve body 74 movable up and down in the valve chamber; and solenoid coils 82. The inlet and outlet lines 18I, 18O are opened to the valve chamber 70 through internal lines 76 and 78, respectively.

In the absence of enegaization of the solenoids 82, the valve body 74

is biased downwardly by a compression spring 84, opening an aperture 80 of the internal line 78 for the outlet line 18O and rendering the common line 18A(B) exposed to the master cylinder pressure. When the solenoids is energized, the valve body is moved upwardly against the spring force, closing the aperture 80 and shutting out the fluid communication between the master cylinder and common line. Since, however, the common line is pressurized with the pump 42A(B), the valve body opens the aperture when the sum of the spring force and the pressure in the common line exceeds the sum of the master cylinder pressure and the electromagnetic force moving the valve body upwardly, allowing the flow from the common line to the valve chamber 70. Accordingly, the pressure in the common line 18 A(B) will be regulated by adjusting the energization current supplied to the solenoids. In this connection, for ensuring this pressure regulation in the common line, the check valve 24A(B), consisting of a valve ball biased by a spring for closing an aperture 88 opened to the valve chamber 70, is provided in parallel, allowing only the flow from the valve chamber to the common line in order to maintain the common line pressure at or above the master cylinder pressure. (The pressure regulation would not work if the common line pressure is lowered below the master cylinder pressure, because the flow from the valve chamber 70 to the common line 18O would occur upon opening the aperture 80.)

In operation, the valves in the hydraulic circuit 10 are positioned as shown in Fig. 1A under normal condition (in the absence of BFD). Thus, the master cylinder pressure is directly reflected in the whole wheel cylinders

26i: The wheel cylinder pressures Pwi are substantially equal to the master cylinder pressure Pm.

However, when it is judged that BFD control is to be started in response to the depression of the brake pedal, etc. (the conditions requiring BFD are explained below in more detail), the valve 28RL, RR in the circuit 10R are closed, isolating the rear wheel cylinders 26RL, RR and holding them at a holding pressure Pc to be determined in a manner as described below. In addition to the closing the valve 28RL, RR, the regulating valves 22A, B and the valves 60A, B are closed and opened, respectively, and the pumps 42A, B are operated. Then, the pressures in the common line 18A, B and wheel cylinders 26FL, FR are varied for generating braking force on the respective front wheels by adjusting the energization current fed to the solenoids in the valves 22A, B with the controller 90.

Consequently, in this embodiment of the present invention, during execution of BFD control, the rear wheel cylinders are held at the holding pressure in order to prevent the locking of the rear wheels prior to the front wheels: the increase in the braking action by the driver after starting of BFD control is reflected only in the pressure in the front wheel cylinders. Under this condition, the front wheel braking pressure is increased beyond the master cylinder pressure, compensating for the shortage in the braking force due to the restriction of the pressure increase in the rear wheel cylinder.

With reference to Figs. 3A and 3B, a control strategy in the embodiment of the present invention will be explained below.

Fig. 3A shows a phase diagram of a condition of braking force

distribution among front and rear wheels, where the theoretically obtained ideal BFD line, well known in the art, (two-dot dashed line) and an actual BFD line (thin solid line) are drawn.

The ideal BFD line indicates a condition in which braking force is so distributed among the front and rear wheels that the front and rear wheels are simultaneously locked (Detailed of this line is described elsewhere). Thus, if a condition of braking force distribution is above this line, the possibility that a rear wheel will be locked prior to front wheels will be high.

The actual BFD line indicates condition in which the same pressure is applied to the wheel cylinders when a vehicle runs at a certain speed. As shown, the actual BFD line linearly increases below the ideal line and intersects with the ideal line at a certain point Fc. Thus, further increase in the rear wheel braking force along the actual line would induce the locking of the rear wheel prior to the front wheels. In order to avoid this, in the embodiment, the rear wheel braking force should be held at the force of the intersecting point Fc, i.e. further increase of the rear wheel braking force is restricted. The force Fc corresponds to a holding pressure Pc. As seen from Fig. 3A, further increase of the total braking force under the condition that the rear wheel braking force would exceed Fc, the master cylinder pressure Pm exceeds the holding pressre (Pm>Pc) is reflected in the front wheel braking force or pressure as shown in the thick line.

In this connection, it has been revealed practically that, when the vehicle speed increases, the ratio of the braking effectiveness of a front wheel to that of a rear wheel is reduced: the decrement of the braking force on a

rear wheel due to the increase of the vehicle speed is smaller than that on the front wheel if the same braking pressure is applied to those wheel cylinders. Accordingly, the actual line is brought closer to the rear wheel axis (ordinate) and the intersecting point Fc is shifted toward 0 along the ideal BFD line, resulting in that the holding force or pressure Fc, Pc should be decreased with the increase of the vehicle speed.

Further, the ideal BFD line is shifted upwardly as a vehicle weight increases. In such a case, as seen from the phase of Fig. 3A, it is preferable that the holding pressure is to be increased, thereby allowing the generation of larger braking force on rear wheels without exerting excessive load on the front wheels. In order to take into account the effect of the vehicle weight on the braking force distribution, the holding pressure determined based upon the vehicle speed is preferably modified to increase as the deceleration decreases. (Supposing a certain braking force is exerted on a vehicle, the deceleration is decreased as the vehicle weight (mass) increases: Braking force = Mass × Deceleration.)

Practically, in the present embodiment, the holding pressure Pc may be determined as a function of a vehicle speed V and a deceleration Gx by using maps of Basic holding pressure Pcs vs. Vehicle speed V as shown in Figs. 4A and Correction pressure ΔPc vs. Deceleration Gx as shown in 4B as follows:

$$Pc = Pcs + \Delta Pc. \qquad (1)$$

These maps may be obtained experimentally or theoretically and memorized in the microcomputer 92. In Fig. 4B, Gxo, where ΔPc = 0, may be a

standard deceleration generated on a standard weighted vehicle during braking.

In accordance with the holding of the rear wheel braking pressure, the total braking force to be exerted for the vehicle will be short, while the locking of the rear wheel prior to the front wheel is prevented. Thus, in the embodiment of the present invention, the front wheel braking force is incremented for compensating for the shortage of the rear wheel braking force. With reference to Fig. 3B showing the braking pressures Pf, Pr in the front and rear wheel cylinders supplied with master cylinder Pm, the pressure Pf for the front wheels will be incremented by ΔPf, i.e. Pf = Pm + ΔPf, while the rear wheel cylinder is held at Pc. The increment ΔPf for the front wheels corresponds to the braking force that would be produced with the restricted amount in the rear wheel braking pressure ΔPr, the difference between Pm and Pr (=Pc).

Practically, the increment ΔPf will be determined as a function of the decrement of the rear wheel braking pressure, i.e. the difference between the master cylinder pressure and holding pressure: Pm – Pc, taking into accounts braking performances of the front and rear wheels and the vehicle speed-dependent braking effectiveness of the front wheels for the vehicle body as described in the followings.

Firstly, a braking force increment on the front wheel ΔFf is equal to a force decrement on the rear wheel ΔFr. ΔFf and ΔFr are given by:

$$\Delta Ff = \Delta Pfo \times (Sf \times Rf \times BEFf)$$

$$\Delta Fr = \Delta Pr \times (Sr \times Rr \times BEFr)$$

where ΔPfo is a basic front wheel braking pressure increment (before corrected with the braking effectiveness dependent upon a vehicle speed); Sf, Sr, sectional areas of the front and rear wheel cylinders; Rf, Rr, braking effective radii for the front and rear wheels; and BEFf, BEFr, braking effectiveness factors for the front and rear wheels. The sectional areas and braking effective radii are determined by specifications of the front and rear wheel braking force generating apparatus, and the braking effectiveness factors are experimentally obtained.

Since ΔFf = ΔFr is to be established, the basic front wheel braking pressure increment is given by:

$$\Delta Pfo=\Delta Pr \times(Sr \times Rr \times BEFr)/(Sf \times Rf \times BEFf)$$

$$=(Pm-Pc) \times(Sr \times Rr \times BEFr)/(Sf \times Rf \times BEFf) \quad (2).$$

Secondly, it has been experimentally revealed that the braking effectiveness factor of the front wheel pressure for a vehicle body, BEF, is decreased dependent upon a vehicle speed as shown in a map of Fig. 5. Thus, the basic front wheel pressure increment may be modified as follows:

$$\Delta Pf = \Delta Pfo \times (1+\Delta BEF/BEFo) \quad (3)$$

where BEFo is a reference braking effectiveness, measured at a predetermined reference speed; and ΔBEF, a deviation of the effectiveness at current speed from the reference. The calculations of expressions (2) and (3) are executed in real time with the microcomputer 92 in which all the required factors, constants and the map can be memorized to be used.

As is not shown here, a braking effectiveness of a rear wheel on the vehicle may be modified similarly with respect to its dependency upon a

vehicle speed.

As noted, the front wheel braking pressure is adjusted to Pm + ΔPf through controlling the energization current fed to the pressure regulating valve 22 and operating the pump 42.

Typically, BFD control for holding the rear wheels at the holding pressure Pc may be started when the master cylinder pressure Pm reaches to the holding pressure Pc on the assumption that the rear wheel braking pressure Pr is nearly equal to the master cylinder pressure in absence of BFD control and any other control for modifying braking pressure.

Further, the BFD control may be started in response to other conditions, for instance, when the deceleration Gx exceeds a reference deceleration Gxs (a positive constant) for starting BFD control; when the difference between an average wheel speed of the front left and right wheels and that of the rear left and right wheels (ΔVw= 1/2(VwFL+VwFR – VwRL –VwRR) exceeds a reference speed Vws (a positive constant) for starting BFD control; and when both the conditions of the deceleration and average wheel speed are established. When BFD is stated to hold the rear wheel braking pressure in response to the conditions other than the master cylinder pressure, the pressure increment for the front wheels will be calculated by regarding the master cylinder pressure Pm at the holding as the holding pressure Pc irrespective of the maps of Figs. 4A and 4B.

Preferably, BFD control lasts as long as Pm, Gx, or ΔVw exceeds Pc, Gxs or ΔVw. In practical, the BFD control may be terminated when either or all of Pm, Gx and ΔVw fall below the respective reference values, Pme (a

positive constant); Gxe(a positive constant); and Vwe (a positive constant). The reference values, Pme, Gxe, Vwe are preferably rather smaller than the corresponding Pc, Gxs, Vws, in order to avoid hunting in the control.

It should be realized that the conditions of the starting and ending of BFD control may be theoretically and/or experimentally determined in various manners known in the art.

When braking force on either of the wheels becomes high and renders the wheel being locked, ABS control will be executed even during BFD control. Because of BFD biased to the front wheels, a front wheel is liable to be locked so that ABS control will be normally executed for either of the front wheels. Since ABS control restricts the braking force involved therewith, thereby decreasing the total force on the vehicle, the braking pressure of the rear wheel cylinders is increased by opening the valves 28RL, RR so as to compensate for the shortage of the front wheel braking force.

Under the circumstance, it is expected that the braking force on the other front wheel is relatively high and, as described above, the pressurization of the common lines 18A, B to provide the pressure increment for the front wheel cylinders would induce excessive pressurization of rear wheel cylinders upon opening the corresponding valves 28RL, RR, which would cause deterioration of the vehicle stability and braking controllability.

Accordingly, in the present embodiment, when ABS control for either of wheels is started, the increment for the front wheel braking pressure ΔPf will be reduced. When ABS control is executed, the increment ΔPf is anticipated to be relatively high (so, a front wheel is being locked). Thus,

instantaneous cancellation of the increment would induce an abrupt and large variation of the braking force on the front wheels, which could cause disturbance of the vehicle attitude, and therefore the process of reducing the increment is gradually or smoothly advanced. For smoothly reducing the increment, preferably, the braking action by the driver is not reflected in of the increment.

Practically, after ABS control is started during BFD execution, the increment of the front wheel braking pressure ΔPf is reduced by ΔP in repetitive processes as described below in conjunction with a flow chart:

$$\Delta Pf = \Delta Pff - \Delta P$$

where ΔPff is the increment of the front wheels braking pressure in the previous cycle. This reducing process lasts in the presence of ABS control until $\Delta Pf = 0$.

In the followings, referring to Fig. 6, the operation of the braking force distribution control device, explained above with reference to Figs. 1A and 1B, will be described. The control according to a control routine shown in Fig. 6 is started by a closure of an ignition switch (not shown in Fig. 1) and cyclically repeated at a cycle time such as several milliseconds during the operation of the vehicle. In this routine, basically, before execution of BFD, the holding pressure Pc is calculated based upon current vehicle speed, etc. in every cycle. However, once the BFD is started, the rear wheel braking pressure is held and the variations of braking action by a driver and demand of BAC, if any, are reflected only in the front wheel braking pressure. Thus, in this case, steps of calculation of the holding pressure and judgment of the

starting of BFD are bypassed until any condition for terminating the BFD is established. When ABS control for either of wheels is executed, the BFD control is not started.

Firstly, in step 10, the signals shown in Fig. 1B and the aforementioned parameters required in the following steps are read in. The information of presence of currently executed ABS control is also acquired.

In step 20, whether or not the BFD control has been already executed is judged. If BFD is not executed, the presence of currently executed ABS control is judged (step 22). If any of wheels is under ABS control, the process is re-started. Until ABS control is terminated, BFD control is not executed. If no ABS control is executed, a holding pressure Pc is determined in steps 30 – 50 based upon a vehicle speed V and a (the) deceleration Gx by using maps in Figs. 4A and 4B.

Next, in steps 60 and 70, it is detected if BFD is to be executed. When the master cylinder Pm, regarded as a current rear wheel braking pressure, exceeds the holding pressure Pc(step 60) or when the other aforementioned condition for starting BFD is established, the judgment of starting of BFD is done and steps 100–120 for calculating the target front wheel braking pressure will be executed by using the aforementioned equations (2)–(3) together with the map in Fig.5. If the judgment of the staring of BFD is done in Step 70, the holding pressure Pc is re-defined to be the value regarded as the current rear wheel braking pressure: Pc ← Pm+ΔPbar, Pc ← Pm(or Pwa), Pc ← Pm.

Then, in accordance with the above result, the valves in the

hydraulic circuit are operated in steps 130. Namely, the valves for isolating the rear wheel cylinders 28RL, RR are closed while the pressure regulating valves 22A, B and valves 60A, B are closed and opened, respectively, and the pumps 42A, B are started. Then, in order to control the front wheel braking pressure, the energization current corresponding to Pf is fed to the regulating valves 22A, B.

If either of conditions for starting BFD is not established in steps 60 and 70, the routine returns to Start without executing steps 100 – 130: without BFD control is not executed.

When BFD has been already executed in the judgment in Step 20, Step 90 is executed directly, in which it is detected if BFD is to be terminated by checking any establishment of the aforementioned conditions for terminating BFD. If none of these conditions is established, then, step 140 for judging if ABS control for any wheel is executed. If no ABS control is executed, steps 100-130 is executed while bypassing steps 20 – 80. In step 130, the valves in the hydraulic circuit are operated so as to control only the front wheel braking pressure because the valves for holding the rear wheel cylinders has been closed in the previous cycle.

On the other hand, if ABS control is executed for either of the wheels, the executed BFD should be ceased as described above. In view of the vehicle stability, however, it is not preferable to nullify the increment ΔPf for the front wheel at once. Thus, the increment ΔPf is gradually reduced by repetitively executing steps 150 – 190. Furthermore, it is preferable that the rear wheel braking pressure is gradually incremented since the braking

force on a front wheel involved with ABS control is restricted.

More specifically, the following processes are executed in every cycle until the increment for the front wheels is nullified: After ABS control execution is detected, ΔP is set to $\Delta P2$ (step 150) and ΔPf is set to $\Delta Pff - \Delta P$ (step 160). ΔPff is ΔPf in the previous cycle. $\Delta P2$ may be a positive constant ($\Delta P2$ may be a value determined with the opening time of the release valves 34FL, FR.) Then, if still $\Delta Pf>0$ (step 170), the front wheel braking pressure is controlled using the decremented increment ΔPf. Further, in step 190, the rear wheel braking pressure is incremented by ΔPc: $Pr = Pc + \Delta Pr$, by operating components in the hydraulic circuit, e.g. by opening the valves 28RL, RR, preferably intermittently. ΔPr may be controlled by the opening time of the valves 28RL, RR.

Consequently, through the repetitive execution of steps 150 – 190 until $\Delta Pf \leq 0$, the front wheel braking pressure increment is gradually decreased while the rear wheel is increased.

When $\Delta Pf \leq 0$ in step 170, the BFD biased to the front wheel has already disappeared and the process of the flowchart is restarted. If ABS control has been terminated during the reduction of the increment for the front wheels (step 140), steps 100 – 130 for normal BFD control are executed.

When any condition for terminating the BFD control is detected in step 90, normally, ΔPf is nearly equal to zero because, expectedly, the master cylinder pressure is almost reduced to the holding pressure Pc (see exp. (2)). However, if the terminating condition is detected due to any abnormal reason such as a failure of sensors, it is possible that ΔPf has a significant

value: the nullification of ΔPf at once would cause a disturbance of the vehicle's running condition. In order to avoid this, the increment ΔPf is gradually reduced when the terminating condition is detected. In this case, ΔP is set to ΔP1, which is larger than ΔP2 because BFD under abnormal condition should be cancelled as soon as possible. Then, the increment ΔPf is reduced in the following steps until ΔPf ≤ 0 in the same manner as in the case under ABS control. Together with the reduction of the increment for the front wheel, the holding of the rear wheel braking pressure is also to be released. However, there is a possibility that the front wheel braking pressure is still high enough to cause an abrupt variation in the rear wheel braking pressure. Thus, in order to avoid this, preferably, the valves 28RL, RR is opened intermittently.

Although the present invention has been described in detail with respect to preferred embodiments thereof, it will be apparent for those skilled in the art that other various modifications are possible with respect to the shown embodiments within the scope of the present invention.

For instance, a braking system implementing the present invention may be of a type in which wheel cylinders for the respective wheels are independently controllable. As long as braking force is controllable beyond the braking force requested by a braking action by a driver, the present invention, in view of its features, is applicable to a braking system of any type.

In the afore-mentioned embodiment, braking force has the identical magnitude in each of pairs of front wheels and rear wheels. However, it

should be realized that, depending upon a behavior and /or a turning condition of a vehicle, the left and right wheels in each pair of wheels may be controlled so as to generate different forces.

Further, the present invention is applicable to systems where a wheel cylinder pressure sensor for each wheels is provided.

In addition, in the present embodiment, rear wheel is held at the holding pressure by closing the corresponding valve. The pressure in a rear wheel cylinder (or front wheel cylinder), however, may be controlled for maintaining a holding pressure through operation of the corresponding valves (pulsative or dithering increase or decrease) in lines connected toward a common line and/or a reservoir. In this connection, the holding force and/or holding pressure for the rear wheel may be varied depending upon a vehicle speed and/or deceleration in every cycle of the control routine during BFD control.

It should be noted that values for a holding pressure, Pc, Pcs or ΔPc and an increment for the front wheels ΔPfo, ΔPf may be determined differently without deviating the scope of the present invention. Although it is preferable to take into account vehicle speed- and deceleration-dependencies and other characteristics of these values for achieving a highly accurate and appropriate control, some of those characteristics may be ignored depending upon the required accuracy of the control and/or costs of manufacturing, operating and/or maintaining a device.

Claims

1. A device for controlling a braking of a vehicle having front and rear wheels, a braking system generating braking forces on the respective wheels, at least one sensor monitoring an operational condition of the vehicle including a detector detecting an amount of a braking action by a driver of the vehicle, and the device executing a braking force distribution control in which braking force on the rear wheels is lowered in comparison with braking force on the front wheels when an operational condition monitored by a sensor among the at least on sensor stratifies a predetermined condition, characterized in that braking force on the front wheels during execution of the braking force distribution control is increased, where a braking force increment on the front wheel beyond braking force corresponding to the braking action is determined based upon an increment of the braking action by the driver detected by the detector; and when anti-skid control for either of the wheels is executed, the braking force increment on the front wheel is decreased.

2. A device of claim 1, characterized in that braking force on the rear wheels is increased when the anti-skid control is executed.

3. A device of claim 1, characterized in that the braking force increment on the front wheel is decreased until the increment reaches to zero.

4. A device of claim 1, characterized in that the decreasing of the braking force increment on the front wheel is interrupted if the anti-skid control is terminated but the increment does not reach to zero.

5. A device of claim 1, wherein the braking system comprises a hydraulic circuit connected with a master cylinder and braking force generating apparatus including wheel cylinders provided for the respective wheels; and the braking action is reflected in a pressure in the master cylinder, characterized in that the decreasing of the braking force increment is executed by decreasing braking pressures in the front wheel cylinders.

6. A device of claim 2, wherein the hydraulic circuit comprises a hydraulic circuit connected with a master cylinder and braking force generating apparatus including wheel cylinders provided for the respective wheels; the braking action is reflected in a pressure in the master cylinder; and valves selectively allowing fluid communication between the master cylinder and the rear wheel cylinders, characterized in that the increasing of the rear wheel braking force is executed by opening the valves.

7. A device of claim 5, wherein the hydraulic circuit comprises at least a common line applying at least one of the front wheel cylinders and at least one of the rear wheel cylinders, and at least a pressure regulating valve in the common line regulating a pressure in the common line and selectively fluidly connecting the common line to master cylinder.

8. A device of claim 7, wherein the hydraulic circuit is of cross dual circuit type.

9. A device of claim 7, wherein the hydraulic circuit is of front-rear dual circuit type.

10. A device of claim 7, wherein the hydraulic circuit comprises valves selectively allowing fluid communication between the common line and the rear wheel cylinders, characterized in that the increasing of the rear wheel braking force is executed by opening the valves.

11. A device of claim 6, wherein the opening of the valves is executed intermittently.

12. A device for controlling a braking of a vehicle having front and rear wheels, a braking system generating braking forces on the respective wheels, at least one sensor monitoring an operational condition of the vehicle including a detector detecting an amount of a braking action by a driver of the vehicle, the device executing a braking force distribution control in which braking force on the rear wheels is lowered in comparison with braking force on the front wheels when an operational condition monitored by a sensor among the at least one sensor stratifies a predetermined condition for starting the braking force distribution control, characterized in that braking

force on the front wheels during execution of the braking force distribution control is increased during execution of the braking force distribution control, but decreased when anti-skid control for either of the wheels is executed or when an operational condition monitored by the sensor stratifies a predetermined condition for terminating the braking force distribution control.

13. A device of claim 12, wherein a rate of decreasing the front wheel braking force when an operational condition monitored by a sensor among the at least one sensor stratifies a predetermined condition for terminating the braking force distribution control is faster than a rate of decreasing the front wheel braking force when anti-skid control for either of the wheels is executed.

14 A device of claim 12, wherein the braking force on the front wheel is decreased until the braking force reaches to braking force requested by the braking action by the driver.

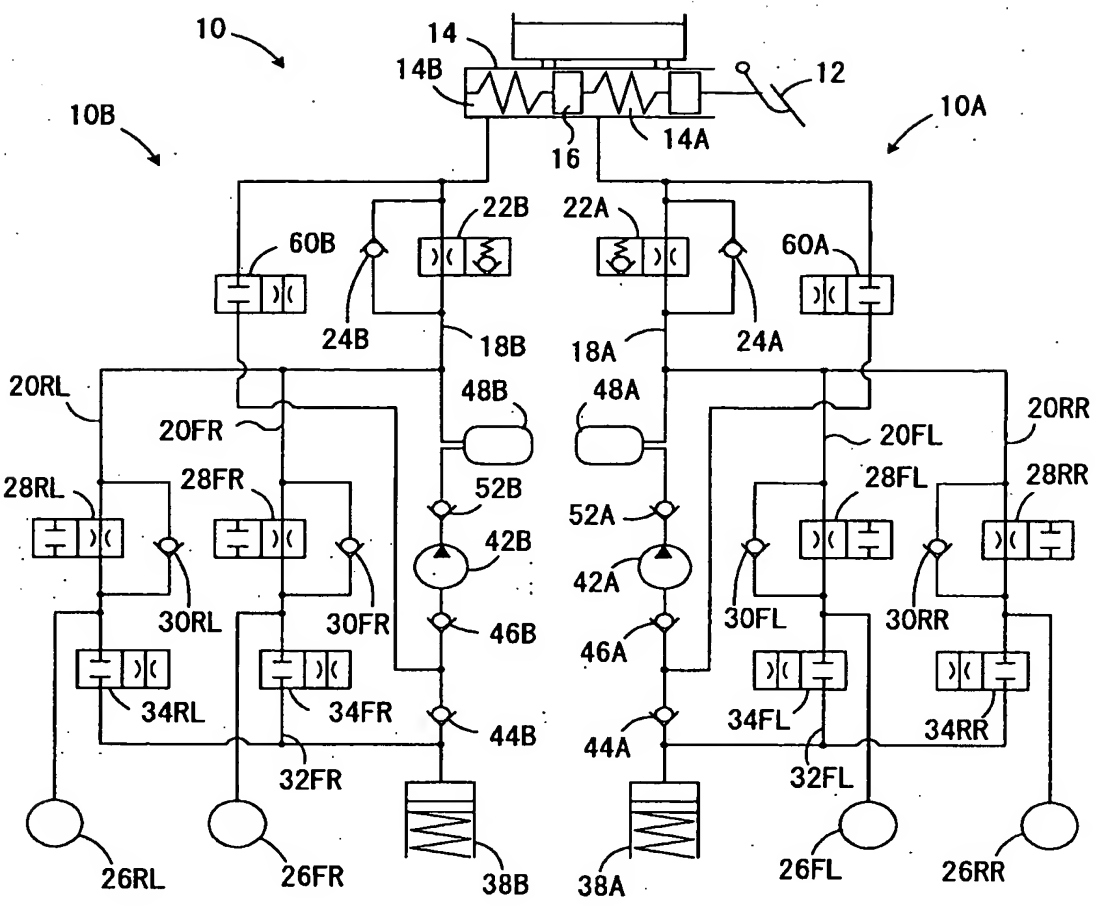
15. A device of claim 12, wherein the increase of the braking force on the rear wheels is restricted during execution of the braking force distribution control but allowed when anti-skid control for either of the wheels is executed or when an operational condition monitored by a sensor among the at least one sensor stratifies a predetermined condition for terminating the braking force distribution control.

ABSTRACT

A braking control device for a vehicle executes braking force distribution (BFD) biased to front wheel in a manner compatible with Anti-skid control. In BFD control, braking force on rear wheels is held at a holding braking force and braking force on the front wheels is incremented beyond braking force requested by a braking action of a driver. After the starting of BFD control, further increase in the braking action is reflected in the front wheel braking force. Upon starting anti-skid control for either of the wheels during the execution of BFD control, an increment of the front wheel braking forces to be requested by BFD control is gradually decreased. Simultaneously, the holding of the rear braking force is released so as to compensate for the shortage of braking force on the front wheel. The gradual decrease of the braking force increment prevents a conflict of BFD and Anti-skid control.

Fig. 6

FIG. 1A


10
14
14B
12
10B
10A
16
14A
22B
22A
60B
60A
24B
18B
18A
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20RL
48B
48A
20RR
20FR
20FL
28RL
28FR
52B
28FL
28RR
52A
42B
42A
30RL
30FR
30FL
30RR
46B
46A
34RL
34FR
34FL
34RR
44B
44A
32FR
32FL
26RL
26FR
38B
38A
26FL
26RR

FIG. 1B

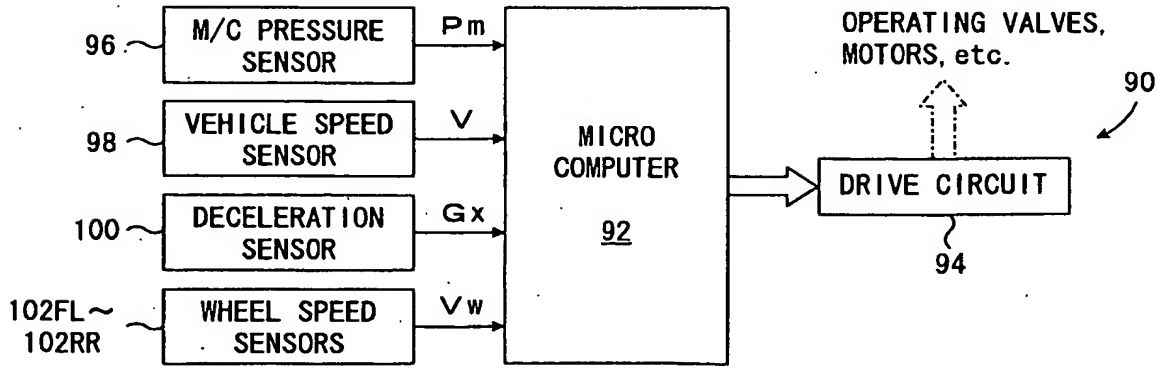

96
M/C PRESSURE SENSOR
Pm
98
VEHICLE SPEED SENSOR
V
100
DECELERATION SENSOR
Gx
102FL~ 102RR
WHEEL SPEED SENSORS
Vw
MICRO COMPUTER
92
OPERATING VALVES, MOTORS, etc.
90
DRIVE CIRCUIT
94

FIG. 2

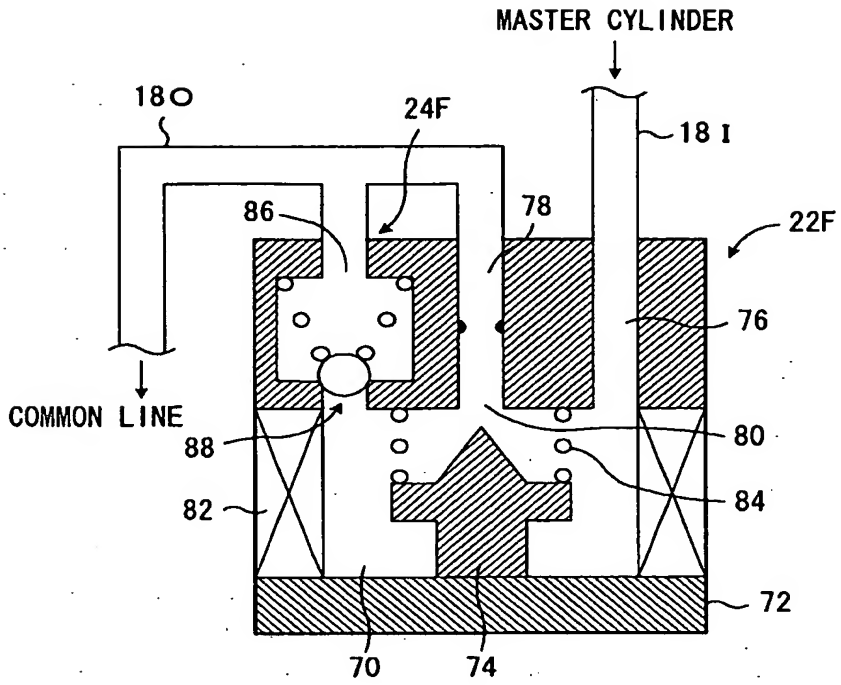

MASTER CYLINDER
180
24F
18 I
86
78
22F
76
COMMON LINE
88
80
82
84
72
70
74

FIG. 3A

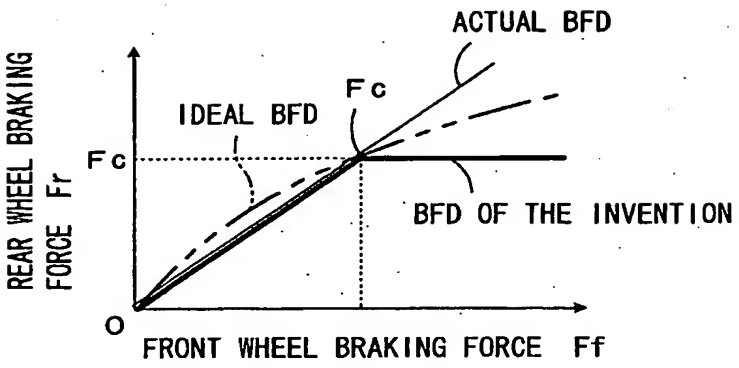

ACTUAL BFD
Fc
IDEAL BFD
Fc
BFD OF THE INVENTION
REAR WHEEL BRAKING FORCE Fr
O
FRONT WHEEL BRAKING FORCE Ff

FIG. 3B

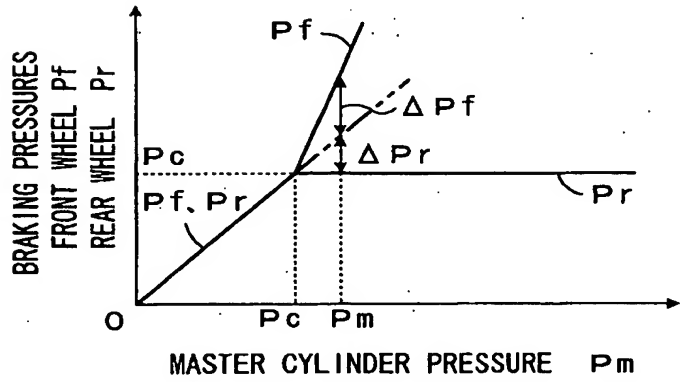

Pf
ΔPf
ΔPr
Pc
Pr
Pf, Pr
BRAKING PRESSURES FRONT WHEEL Pf REAR WHEEL Pr
O
Pc
Pm
MASTER CYLINDER PRESSURE Pm

FIG. 4A

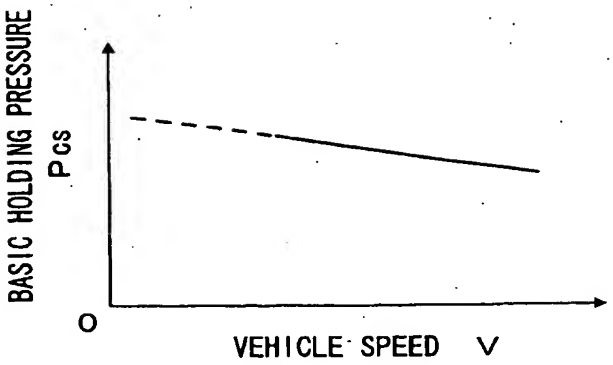


FIG. 4B

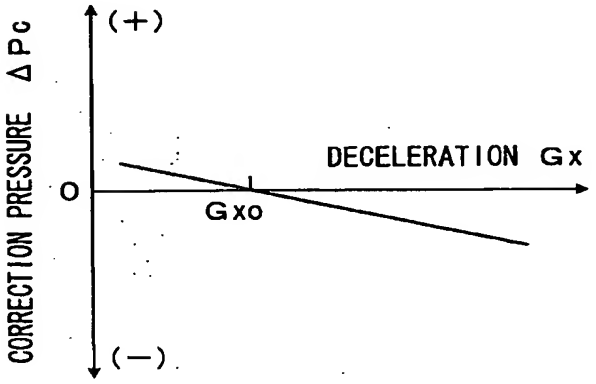


FIG. 5

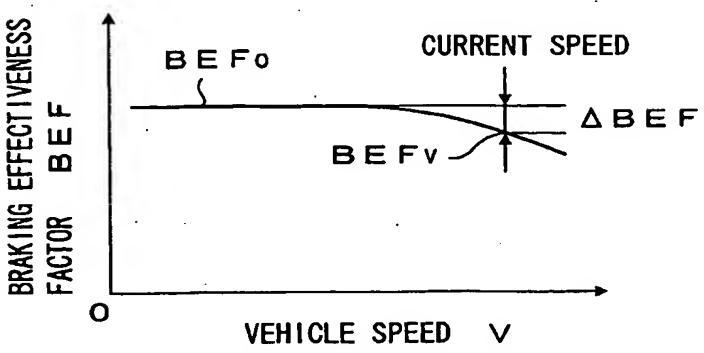
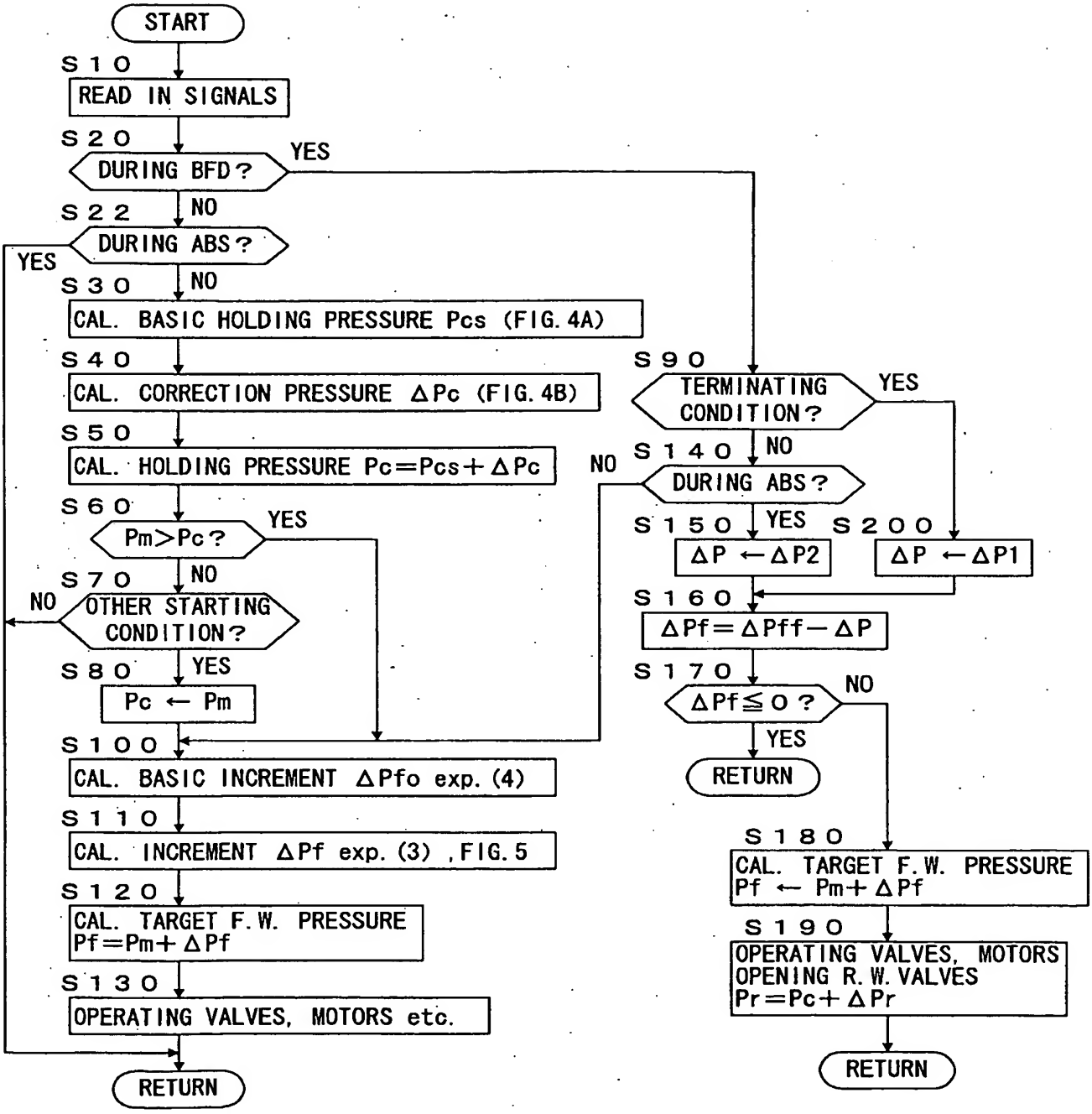


FIG. 6


START
S10
READ IN SIGNALS
S20
DURING BFD?
YES
S22
NO
DURING ABS?
YES
S30
NO
CAL. BASIC HOLDING PRESSURE Pcs (FIG. 4A)
S40
CAL. CORRECTION PRESSURE ΔPc (FIG. 4B)
S50
CAL. HOLDING PRESSURE Pc=Pcs+ΔPc
S60
Pm>Pc?
YES
S70
NO
NO
OTHER STARTING CONDITION?
S80
YES
Pc ← Pm
S100
CAL. BASIC INCREMENT ΔPfo exp. (4)
S110
CAL. INCREMENT ΔPf exp. (3), FIG. 5
S120
CAL. TARGET F.W. PRESSURE Pf=Pm+ΔPf
S130
OPERATING VALVES, MOTORS etc.
RETURN
S90
TERMINATING CONDITION?
YES
S140
NO
NO
DURING ABS?
S150
YES
ΔP ←ΔP2
S200
ΔP ←ΔP1
S160
ΔPf=ΔPff−ΔP
S170
ΔPf≦0?
NO
YES
RETURN
S180
CAL. TARGET F.W. PRESSURE Pf ← Pm+ΔPf
S190
OPERATING VALVES, MOTORS OPENING R.W. VALVES Pr=Pc+ΔPr
RETURN

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ALEXANDRIA, VA 22320-4850

EXAMINER	
MANCHO, RONNIE M	
ART UNIT	PAPER NUMBER
3663	
MAIL DATE	DELIVERY MODE
03/07/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Interview Summary	Application No.	Applicant(s)	
	10/815,765	HAMADA ET AL.	
	Examiner	Art Unit	
	RONNIE MANCHO	3663	

All participants (applicant, applicant's representative, PTO personnel):

(1) *RONNIE MANCHO*. (3)_____.

(2) *Scott Schulte*. (4)_____.

Date of Interview: *27 February 2008*.

Type: a)☒ Telephonic b)☐ Video Conference
c)☐ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: _____.

Claim(s) discussed: *1,12 and 13*.

Identification of prior art discussed: *Watanabe(20020185913)* .

Agreement with respect to the claims f)☐ was reached. g)☒ was not reached. h)☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *See Continuation Sheet*.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

/R. M./
Examiner, Art Unit 3663
/Khoi Tran/ SPE
Examiner's signature, if required

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: The applicant faxed a proposed claim amendment that he believes overcomes the 112 second antecedent basis rejection in the claims. It appears that the amendment does not overcome the antecedent basis rejection in the claims. Applicant was advised to identify in the claims the structure that executes "anti-skid control" as disclosed in the specification or cancel the limitation from the claims to overcome the 112 antecedent basis rejection. No new matter should be added.

Applicant's proposed cancellation of the phrase "for terminating the braking force distribution control" in claim 12 and its dependent claims will overcome the antecedent basis rejection thereto.

The examiner did not agree with applicant's interpretation of the prior art fig. 4.

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Chiaki HAMADA et al. Group Art Unit: 3663

Application No.: 10/815,765 Examiner: R. MANCHO

Filed: April 2, 2004 Docket No.: 119332

For: VEHICLE BRAKING CONTROL DEVICE FOR BRAKING FORCE DISTRIBUTION

AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In reply to the October 29, 2007 Office Action and the February 27, 2008 telephone interview, the period for reply being extended by the attached Petition for Extension of Time, please consider the following:

Amendments to the Claims as reflected in the listing of the claims; and

Remarks.

AMENDMENTS TO THE CLAIMS:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A device for controlling a braking of a vehicle having front and rear wheels, comprising:

a braking system generating braking forces on the respective wheels,

at least one sensor monitoring an operational condition of the vehicle including a detector detecting an amount of a braking action by a driver of the vehicle, and

a controller that is configured to execute an anti-skid control and that is configured to execute a braking force distribution control in which braking force on the front wheels is increased in comparison with braking force on the rear wheels when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition, wherein:

braking force on the front wheels during execution of the braking force distribution control is increased, where a braking force increment on the front wheel is determined based upon an increment of the braking action by the driver detected by the detector; ~~and~~; however,

when execution of the anti-skid control for either of the front wheels is ~~executed~~started during the braking force distribution control, the braking force increment on the front wheels is decreased during the braking force distribution control.

2. (Original) A device of claim 1, characterized in that braking force on the rear wheels is increased when the anti-skid control is executed.

3. (Original) A device of claim 1, characterized in that the braking force increment on the front wheel is decreased until the increase reaches to zero.

4. (Original) A device of claim 1, characterized in that the decreasing of the braking force increment on the front wheel is interrupted if the anti-skid control is terminated but the increment does not reach zero.

5. (Original) A device of claim 1, wherein the braking system comprises a hydraulic circuit connected with a master cylinder and braking force generating apparatus including wheel cylinders provided for the respective wheels; and the braking action is reflected in a pressure in the master cylinder, characterized in that the decreasing of the braking force increment is executed by decreasing braking pressures in the front wheel cylinders.

6. (Original) A device of claim 2, wherein the hydraulic circuit comprises a hydraulic circuit connected with a master cylinder and braking force generating apparatus including wheel cylinders provided for the respective wheels; the braking action is reflected in a pressure in the master cylinder; and valves selectively allowing fluid communication between the master cylinder and the rear wheel cylinders, characterized in that the increasing of the rear wheel braking force is executed by opening the valves.

7. (Previously Presented) A device of claim 5, wherein the hydraulic circuit comprises at least a common line supplying at least one of the front wheel cylinders and at least one of the rear wheel cylinders, and at least a pressure regulating valve in the common line regulating a pressure in the common line and selectively fluidly connecting the common line to master cylinder.

8. (Original) A device of claim 7, wherein the hydraulic circuit is a cross dual circuit type.

9. (Original) A device of claim 7, wherein the hydraulic circuit is of front-rear dual circuit type.

10. (Original) A device of claim 7, wherein the hydraulic circuit comprises valves selectively allowing fluid communication between the common line and the rear wheel

cylinders, hardware in that the increasing of the rear wheel braking force is executed by opening the valves.

11. (Original) A device of claim 6, wherein the opening of the valves is executed intermittently.

12. (Currently Amended) A device for controlling a braking of a vehicle having front and rear wheels, comprising:

a braking system generating braking forces on the respective wheels,

at least one sensor monitoring an operational condition of the vehicle including a detector detecting an amount of a braking action by a driver of the vehicle, and

a controller that is configured to execute an anti-skid control and that is configured to execute a braking force distribution control in which braking force on the front wheels is increased in comparison with braking force on the rear wheels when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition for starting the braking force distribution control, wherein:

braking force on the front wheels is increased during execution of the braking force distribution control, but decreased during execution of the braking force distribution control when execution of the anti-skid control for either of the front wheels is started during the braking force distribution control~~executed or when an operational condition monitored by the sensor satisfies a predetermined condition for terminating the braking force distribution control~~.

13. (Previously Presented) A device of claim 12, wherein a rate of decreasing the front wheel braking force when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition for terminating the braking force distribution control is faster than a rate of decreasing the front wheel braking force when anti-skid control for either of the wheel is executed.

14. (Original) A device of claim 12, wherein the braking force on the front wheel is decreased until the braking force reaches a braking force requested by the braking action by the driver.

15. (Previously Presented) A device of claim 12, wherein the increase of the braking force on the rear wheels is restricted during execution of the braking force distribution control but allowed when anti-skid control for either of the wheels is executed or when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition for terminating the braking force distribution control.

REMARKS

Claims 1-15 are pending. By this Amendment, claims 1 and 12 are amended.

Applicants appreciate the courtesies shown to Applicants' representative by Examiner Mancho in the February 27, 2008 telephone interview. Applicants' separate record of the substance of the interview is incorporated into the following remarks.

Claims 1-15 were rejected under 35 U.S.C. §112, second paragraph. The rejection is respectfully traversed.

With regard to the phrase "when anti-skid control for," claims 1 and 12 have been amended in order to clarify that it is the controller that is configured to execute an anti-skid control as suggested by the Examiner during the telephone interview. The phrase "for terminating the braking force distribution control" has been removed from claim 12, thus rendering this ground for rejection moot.

It is respectfully requested that the rejection be withdrawn.

Claims 1-15 were rejected under 35 U.S.C. §102(b) over Watanabe, U.S. Publication No. 2002/0185913. The rejection is respectfully traversed.

Claim 1 calls for a controller that is configured to execute a braking force distribution control, wherein braking force on the front wheels during execution of the braking force distribution control is increased, where a braking force increment on the front wheel is determined based upon an increment of the braking action by the driver detected by the detector; however, when execution of the anti-skid control for either of the front wheels is started during the braking force distribution control, the braking force increment on the front wheels is decreased during the braking force distribution control. Claim 12 calls for similar features.

Watanabe fails to provide any disclosure with regard to executing or starting an anti-skid control during the braking force distribution control. Watanabe determines if an anti-skid control is being performed in order to determine if a braking force distribution control is

allowed (paragraph [0075]). As illustrated by steps S33, S34 and S38 of Fig. 4, a braking force distribution control is not allowed if an anti-skid control is being performed.

Watanabe thus fails to disclose executing an anti-skid control for either of the front wheels during the braking force distribution control as called for by claims 1 and 12. Because Watanabe fails to disclose this feature, Watanabe fails to achieve the advantages as discussed in Applicants' specification. In particular, as discussed on page 22, line 7-page 23, line 13 of Applicants specification, an anti-skid control for either of the front wheels is executed during the braking force distribution control because if the braking force distribution control is abruptly cancelled, a disturbance of the vehicle attitude would be created.

During the telephone interview, Examiner Mancho asserted that if an anti-skid control was performed for both of the left front wheel and the right front wheel at the same time, then the answer would be "NO" in both of steps S33 and S34 of Fig. 4 and a braking force distribution control would be performed at step S37. Applicants do not agree with this analysis because Watanabe fails to discuss this scenario and because Watanabe is simply determining whether the road has an uneven friction coefficient (paragraph [0077]).

However, in an effort to expedite prosecution, claims 1 and 12 have been clarified to recite that the braking force on the front wheels is decreased during the braking force distribution control when execution of the anti-skid control for either of the front wheels is started during the braking force distribution control. This feature is clearly supported by Applicants' page 22, lines 7-14, for example. Even if an anti-skid control was performed for both of the left front wheel and the right front wheel at the same time as asserted by Examiner Mancho (which Applicants do not agree with the Examiner's analysis), Watanabe still fails to disclose all of the features of claims 1 and 12 because execution of Watanabe's anti-skid control is started before (and not during) the braking force distribution control.

It is respectfully requested that the rejection be withdrawn.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

James A. Oliff
Registration No. 27,075

Scott M. Schulte
Registration No. 44,325

JAO:SMS/khm
Attachment:
Petition for Extension of Time

Date: March 28, 2008

OLIFF & BERRIDGE, PLC
P.O. Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
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Charge any fee due to our Deposit Account No. 15-0461

UNITED STATES PATENT AND TRADEMARK OFFICE

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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/815,765	04/02/2004	Chiaki Hamada	119332	9946

25944 7590 07/10/2008

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ALEXANDRIA, VA 22320-4850

EXAMINER	
MANCHO, RONNIE M	
ART UNIT	**PAPER NUMBER**
3664	

NOTIFICATION DATE	DELIVERY MODE
07/10/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

Office Action Summary	Application No.	Applicant(s)	
	10/815,765	HAMADA ET AL.	
	Examiner	Art Unit	
	RONNIE MANCHO	3664	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 March 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/11/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Watanabe (2002/0185913).

Regarding claim 1, Watanabe (abstract, sec 0008, 0009, 0019-0021, 0062, 0068, 0075; figs. 1-5) disclose a device for controlling braking of a vehicle, the vehicle having front and rear wheels, the device comprising:

a braking system ((figs. 1A&B) generating braking forces on the respective wheels (abstract, sec 0008, 0009, 0019-0021; figs. 1-5);

at least one sensor 96 (fig. 1B) monitoring an operational condition of the vehicle including a detector detecting an amount of a braking action by a driver of the vehicle (abstract, sec 0008, 0009, 0019-0021; figs. 1-5); and

a controller 92 (fig. 1B) that is configured to execute an anti-skid control (ABS (sec. 0062) and that is configured to execute a braking force distribution control in which braking force on the front wheels is increased in comparison with braking force on the rear wheels (abstract, sec 0008, 0009, 0019-0021; figs. 1-5) when an operational

condition monitored by a sensor among the at least one sensor satisfies a predetermined condition, wherein:

braking force on the front wheels during execution of the braking force distribution control is increased (abstract, see 0008, 0009, 0019-0021; figs. 1-5), and wherein a braking force increment on the front wheel is determined based upon an increment of the braking action by the driver detected by the detector (abstract, sec 0008, 0009, 0019-0021; figs. 1-5); however,

when execution of the antiskid control for either of the front wheels is started (sec. 0062, 0068, 0075; figs.4-5), during the braking distribution control, the braking force increment on the front wheels is decreased during the braking distribution control (sec. 0062, 0068, 0075; figs.4-5).

Regarding claim 2, Watanabe (abstract, sec 0008, 0009, 0019-0021, 0062, 0068, 0075; figs. 1-5) disclose the device of claim 1, characterized in that braking force on the rear wheels is increased when the anti-skid control is executed.

Regarding claim 3, Watanabe (abstract, sec 0008, 0009, 0019-0021, 0062, 0068, 0075; figs. 1-5) disclose the device of claim 1, characterized in that the braking force increment on the front wheel is decreased until the increment reaches to zero.

Regarding claim 4, Watanabe (abstract, sec 0008, 0009, 0019-0021, 0062, 0068, 0075; figs. 1-5) disclose the device of claim 1, characterized in that the decreasing of the braking force increment on the front wheel is interrupted if the anti-skid control is terminated but the increment does not reach to zero.

Regarding claim 5, Watanabe (abstract, sec 0008, 0009, 0019-0021, 0062, 0068, 0075; figs. 1-5) disclose the device of claim 1, wherein the braking system comprises a

hydraulic circuit connected with a master cylinder and braking force generating apparatus including wheel cylinders provided for the respective wheels; and the braking action is reflected in a pressure in the master cylinder, characterized in that the decreasing of the braking force increment is executed by decreasing braking pressures in the front wheel cylinders.

Regarding claim 6, Watanabe (abstract, sec 0008, 0009, 0019-0021, 0062, 0068, 0075; figs. 1-5) disclose the device of claim 2, wherein the hydraulic circuit comprises a hydraulic circuit connected with a master cylinder and braking force generating apparatus including wheel cylinders provided for the respective wheels; the braking action is reflected in a pressure in the master cylinder; and valves selectively allowing fluid communication between the master cylinder and the rear wheel cylinders, characterized in that the increasing of the rear wheel braking force is executed by opening the valves.

Regarding claim 7, Watanabe (abstract, sec 0008, 0009, 0019-0021, 0062, 0068, 0075; figs. 1-5) disclose the device of claim 5, wherein the hydraulic circuit comprises at least a common line supplying at least one of the front wheel cylinders and at least one of the rear wheel cylinders, and at least a pressure regulating valve in the common line regulating a pressure in the common line and selectively fluidly connecting the common line to master cylinder.

Regarding claim 8, Watanabe (abstract, sec 0008, 0009, 0019-0021, 0062, 0068, 0075; figs. 1-5) disclose the device of claim 7, wherein the hydraulic circuit is of cross dual circuit type (sec. 0021).

Regarding claim 9, Watanabe (abstract, sec 0008, 0009, 0019-0021, 0062, 0068, 0075; figs. 1-5) disclose the device of claim 7, wherein the hydraulic circuit is of front-rear dual circuit type.

Regarding claim 10, Watanabe (abstract, sec 0008, 0009, 0019-0021, 0062, 0068, 0075; figs. 1-5) disclose the device of claim 7, wherein the hydraulic circuit comprises valves selectively allowing fluid communication between the common line and the rear wheel cylinders, characterized in that the increasing of the rear wheel braking force is executed by opening the valves.

Regarding claim 11, Watanabe (abstract, sec 0008, 0009, 0019-0021, 0062, 0068, 0075; figs. 1-5) disclose the device of claim 6, wherein the opening of the valves is executed intermittently.

Regarding claim 12, Watanabe (abstract, sec 0008, 0009, 0019-0021, 0062, 0068, 0075; figs. 1-5) disclose a device for controlling braking of a vehicle having front and rear wheels, comprising:

a braking system (figs. 1A&B) generating braking forces on the respective wheels (abstract, sec 0008, 0009, 0019-0021; figs. 1-5);

at least one sensor 19 (fig. 1B) monitoring an operational condition of the vehicle including a detector detecting an amount of a braking action by a driver of the vehicle (abstract, sec 0008, 0009, 0019-0021; figs. 1-5); and

a controller 92 (fig. 1B) that is configured to execute an anti-skid control (ABS (sec. 0062) and that is configured to execute a braking force distribution control in which braking force on the front wheels is increased in comparison with braking force on the rear wheels (abstract, sec 0008, 0009, 0019-0021; figs. 1-5) when an operational

condition monitored by a sensor among the at least one sensor satisfies a predetermined condition, wherein:

braking force on the front wheels is increased (abstract, sec 0008, 0009, 0019-0021; figs. 1-5) during execution of the braking force distribution control, but decreased during execution of the braking force distribution control when execution of the antiskid control for either of the front wheels is started during the braking force distribution control (0062, 0068, 0075; figs. 4-5).

Regarding claim 13, Watanabe (abstract, sec 0008, 0009, 0019-0021, 0062, 0068, 0075; figs. 1-5) disclose the device of claim 12, wherein a rate of decreasing the front wheel braking force when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition for terminating the braking force distribution control is faster than a rate of decreasing the front wheel braking force when anti-skid control for either of the wheels is executed.

Regarding claim 14, Watanabe (abstract, sec 0008, 0009, 0019-0021, 0062, 0068, 0075; figs. 1-5) disclose the device of claim 12, wherein the braking force on the front wheel is decreased until the braking force reaches to braking force requested by the braking action by the driver.

Regarding claim 15, Watanabe (abstract, sec 0008, 0009, 0019-0021, 0062, 0068, 0075; figs. 1-5) disclose the device of claim 12, wherein the increase of the braking force on the rear wheels is restricted during execution of the braking force distribution control but allowed when anti-skid control for either of the wheels is executed or when an operational condition monitored by a sensor among the at least one sensor satisfies a predetermined condition for terminating the braking force distribution control.

Response to Arguments

3. Applicant's arguments filed 3/28/08 have been fully considered but they are not all persuasive.

The 112 rejections and the MPEP 2114/2115 rejections have been vacated in view of applicant's amendments.

Applicant traverses the 102 rejections in view of Watanabe. The examiner disagrees. Applicant ignores all the sections cited in the prior art and further misinterprets the prior art. Applicant argues that the prior art fails to provide executing or starting an antiskid control during braking force distribution control. Applicant again admits that sec. 0075 determines if anti-skid is being performed. Applicant's arguments therefore appear to be contradictory. Applicant further argues that in the prior art braking force distribution is allowed on the one hand and on the other hand braking force distribution control is not allowed. The examiner does not understand the basis of the argument as "allowed or not allowed" is not claimed. However, the examiner notes that the cited sections above read on the claims. Applicant failed to address all the sections cited by the examiner in the rejection.

Applicant further argues in an interview, the examiner indicated that step 33 and step 34 of the prior art as being executed at the same time. This is not correct because S33 is executed first before S 34 is executed. However, the argument is not on point since the claims do not call for step 33 and step 34 of the prior art. Further applicant does not provide a date of the interview or any record of the interview.

Applicant further argues that anti-skid control in the prior art is started before (and not during) the braking distribution control. The examiner disagrees and asks applicant to show where the prior art discloses that "anti-skid control in the prior art ***is started before (and not during)*** the braking distribution control", emphasis added. The examiner further notes that anti-skid control is also braking force distribution control. Applicant has not shown that they are different.

It is believed that the prior art anticipates the claims. The rejection thus stands.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Communication

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to RONNIE MANCHO whose telephone number is (571)272-6984. The examiner can normally be reached on Mon-Thurs: 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tran Khoi can be reached on 571-272-6919. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ronnie Mancho
Examiner
Art Unit 3664

7/3/2008
/Khoi H Tran/
Supervisory Patent Examiner, Art Unit 3664

Sheet 1 of 1

Form PTO-1449 (REV. 1/06)	US Dept. of Commerce PATENT & TRADEMARK OFFICE	ATTY DOCKET NO. 119332	APPLICATION NO. 10/815,765
INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)		APPLICANT(S) Chiaki HAMADA et al.	
		FILING DATE April 2, 2004	GROUP 3663

U.S. PATENT DOCUMENTS

Examiner Initials	Cite No.	Document Number	Date	Name

FOREIGN PATENT DOCUMENTS

Examiner Initials	Cite No.	Document Number	Date	Country	With English Abstract	With English Translation
	1	JP-A-2002-2466	01/9/2002	JAPAN	X	X
	2	JP-A-2000-16259	01/18/2000	JAPAN	X	X
	3	JP-A-09-136627	05/27/1997	JAPAN	X	X

OTHER DOCUMENTS

Examiner Initials	Cite No.	(Including Author, Title, Date, Pertinent Pages, etc.)

EXAMINER	/Ronnie Mancho/ (07/03/2008)	DATE CONSIDERED

Examiner: Initial if citation considered, whether or not citation is in conformance with M.P.E.P. 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Date: December 11, 2007 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /R.M./

the braking force distribution control, the braking force increment on the front wheels is decreased during the braking force distribution control. Claim 12 calls for similar features.

Watanabe fails to disclose all of the features recited in claims 1 and 12 because Watanabe fails discuss starting execution of the anti-skid control during the braking force distribution control or having the braking force increment decrease during the braking force distribution control. To support this argument, Applicant herein (1) discusses all of the sections cited in the Office Action related to braking force distribution control and anti-skid control, (2) explains that, although Watanabe performs an anti-skid control, the anti-skid control is not started during the braking force distribution control as called for by claims 1 and 12, and (3) asserts that Watanabe only discusses performing an anti-skid control and a braking force distribution control at separate times.

(1) THE OFFICE ACTION

Pages 2, 3, 5 and 6 of the Office Action refers to Watanabe's abstract, paragraphs [0008], [0009] and [0019]-[0021] and Figs. 1-5 in order to assert that Watanabe discloses the braking force distribution control of claims 1 and 12.

Watanabe's abstract and paragraphs [0008], [0009] and [0019]-[0021] discuss different ways of increasing the braking force applied to the front wheels such that the braking force applied to the front wheels versus the braking force applied to the rear wheels increases, and the advantages thereof. Watanabe never discusses having the braking force increment on the front wheels decrease during the braking force distribution control as called for by claims 1 and 12, or having execution of the anti-skid control started during the braking force distribution control as called for by claims 1 and 12.

Fig. 1 is a block diagram, Fig. 2 is a sectional view of the control valve, Fig. 3 is a flowchart of the brake control routine, Fig. 4 is a flowchart showing a control scheme executed at step S30 of Fig. 3 where it is determined whether execution of the braking force distribution

PATENT APPLICATION

RESPONSE UNDER 37 CFR §1.116
EXPEDITED PROCEDURE
TECHNOLOGY CENTER ART UNIT 3664

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Chiaki HAMADA et al. Group Art Unit: 3664

Application No.: 10/815,765 Examiner: R. MANCHO

Filed: April 2, 2004 Docket No.: 119332

For: VEHICLE BRAKING CONTROL DEVICE FOR BRAKING FORCE DISTRIBUTION

REQUEST FOR RECONSIDERATION AFTER FINAL REJECTION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In reply to the July 10, 2008 Office Action, and after entry of the attached Petition for Extension of Time, reconsideration of the above-identified application is respectfully requested in light of the following remarks. Claims 1-15 are pending.

Claims 1-15 were rejected under 35 U.S.C. §102(e) over Watanabe, U.S. Publication No. 2002/0185913. The rejection is respectfully traversed.

Claim 1 calls for a controller that is configured to execute a braking force distribution control, wherein braking force on the front wheels during execution of the braking force distribution control is increased, where a braking force increment on the front wheel is determined based upon an increment of the braking action by the driver detected by the detector; however, when execution of the anti-skid control for either of the front wheels is started during

control is allowed and Fig. 5 is a graph. Watanabe again never discusses having the braking force increment on the front wheels decrease during the braking force distribution control as called for by claims 1 and 12 or having execution of the anti-skid control started during the braking force distribution control as called for by claims 1 and 12.

Pages 3 and 6 of the Office Action refers to Watanabe's paragraphs [0062], [0068] and [0075] and again refers to Figs. 4 and 5 in order to assert that Watanabe discloses the anti-skid control of claims 1 and 12. Paragraph [0062] discusses performing anti-skid control so as to decrease excessive brake slip of the wheels, paragraph [0068] discusses performing anti-skid control when necessary according to known techniques and paragraph [0075] and Fig. 4 discuss determining if an anti-skid control is being performed in order to determine if braking force distribution control is allowed. Watanabe again never discusses having the braking force increment on the front wheels decrease during the braking force distribution control as called for by claims 1 and 12 or having execution of the anti-skid started during the braking force distribution control as called for by claims 1 and 12.

(2) WATANABE'S ANTI-SKID CONTROL IS NOT STARTED DURING A BRAKING FORCE DISTRIBUTION CONTROL

Watanabe fails to provide any discussion with regard to starting execution of the anti-skid control for either of the front wheels during the braking force distribution control as called for by claim 1 and similarly called for by claim 12.

Watanabe's paragraph [0068] and Fig. 3 discuss determining the master cylinder pressure Pm (step S10) and the target brake pressure Pti of each wheel (step S2) that can account for reducing excessive brake slip of the wheel. Thereafter, it is determined whether execution of front and rear wheel braking force distribution control is allowed (step S30). Watanabe's paragraphs [0075] and [0076] and Fig. 4, discuss how it is determined whether braking force distribution control is allowed (step S30). As illustrated by steps S33, S34 and

S38 of Fig. 4, a braking force distribution control is not allowed if an anti-skid control is being performed.

Watanabe simply determines if an anti-skid control is being performed in order to determine if the braking force distribution control is allowed. Watanabe fails to provide any discussion as to when execution of the anti-skid control is started. Therefore, Watanabe fails disclose executing a braking force distribution control, wherein when execution of the anti-skid control for either of the front wheels is started during the braking force distribution control, the braking force increment on the front wheels is decreased during the braking force distribution control, as called for by claim 1 and as similarly called for by claim 12.

(3) WATANABE PERFORMS ANTI-SKID CONTROL AND BRAKING FORCE DISTRIBUTION CONTROL AT SEPARATE TIMES

As discussed above, Watanabe fails to provide any discussion as to when execution of the anti-skid control is started. In addition, Watanabe only discusses increasing the braking force during the braking force distribution control (abstract and paragraphs [0008], [0009] and [0019]-[0021]) and preventing the braking force distribution control from occurring during an anti-skid control (paragraphs [0075] and [0076] and Fig. 4). In other words, Watanabe only discusses increasing the braking force during the braking force distribution control and only discusses decreasing the braking force during the anti-skid control. Watanabe never discusses having the anti-skid control performed during the braking force distribution control or decreasing the braking force during the braking force distribution control.

Applicants therefore assert that Watanabe performs an anti-skid control and a braking force distribution control at separate times, and thus fails to execute a braking force distribution control, wherein when execution of the anti-skid control for either of the front wheels is started during the braking force distribution control, the braking force increment on the front wheels is

decreased during the braking force distribution control, as called for by claim 1 and as similarly called for by claim 12.

Because Watanabe fails to disclose the above features or identify any problems associated with switching to an anti-skid control, Watanabe fails to achieve the advantages as discussed in Applicants' specification. In particular, as discussed on page 22, line 7-page 23, line 13 of Applicants specification, an anti-skid control for either of the front wheels is executed during the braking force distribution control as called for by claims 1 and 12, because if the braking force distribution control is abruptly cancelled, a disturbance of the vehicle attitude would be created.

* * * * *

In view of the foregoing, it is respectfully requested that the rejection be withdrawn.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

James A. Oliff
Registration No. 27,075

Scott M. Schulte
Registration No. 44,325

JAO:SMS/dxc

Attachment:
Petition for Extension of Time

Date: November 10, 2008

OLIFF & BERRIDGE, PLC
P.O. Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/815,765	04/02/2004	Chiaki Hamada	119332	9946

25944 7590 11/26/2008

OLIFF & BERRIDGE, PLC
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ALEXANDRIA, VA 22320-4850

EXAMINER	
MANCHO, RONNIE M	
ART UNIT	**PAPER NUMBER**
3664	

MAIL DATE	DELIVERY MODE
11/26/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 10/815,765	**Applicant(s)** HAMADA ET AL.	
	Examiner RONNIE MANCHO	**Art Unit** 3664	

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 10 November 2008 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:
   a) ☒ The period for reply expires 3 months from the mailing date of the final rejection.
   b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

   Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☐ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   (a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);
   (b) ☐ They raise the issue of new matter (see NOTE below);
   (c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   (d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

   NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☐ For purposes of appeal, the proposed amendment(s): a) ☐ will not be entered, or b) ☐ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.

   The status of the claim(s) is (or will be) as follows:
   Claim(s) allowed: _____.
   Claim(s) objected to: _____.
   Claim(s) rejected: _____.
   Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: The prior art still reads on the claims. There are no claim amendments in applicant's response dated 11/10/08. Applicant's newly raised argumenents are not convincing. The rejection in the office action dated 7/10/08 is deemed proper and thus stands.
12. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
13. ☐ Other: _____.

/KHOI TRAN/
Supervisory Patent Examiner, Art Unit 3664